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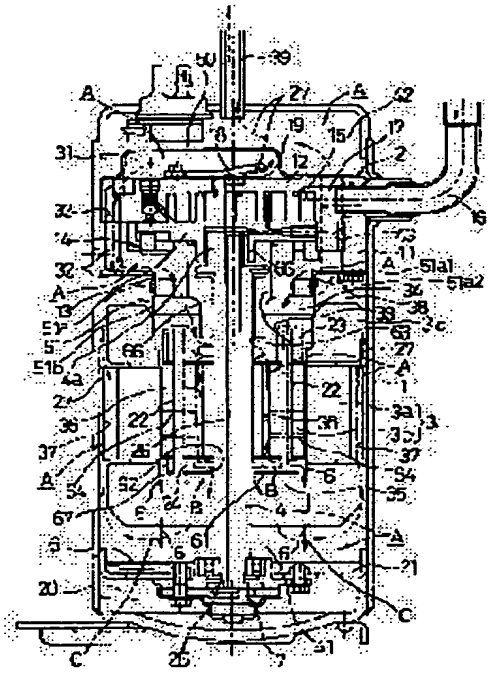
## (54) CLOSED TYPE COMPRESSOR AND ITS GAS-LIQUID SEPARATION AND DISCHARGE METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To discharge gas sufficiently gas-liquid separated by handling refrigerant and oil by roughly constraining them.
SOLUTION: An original purpose is performed by centrifugally separating gas and liquid by applying forced revolution by rotation of a rotator 3b to discharge gas 27 from a compression mechanism 2 and oil 6 after supplied to the compression mechanism 2 and its bearing part 66 by introducing them to a rotator lower part chamber 35 through a rotator passage 36 from a rotator upper part chamber 33 by roughly constraining them, introducing the gas 27 separated from the oil to stator upper part chamber 38 out of the constrained region through a stator passage 37 from an electric motor lower part chamber 41 and discharging it out of a closed container 1 from a part above a position of the stator upper part chamber 38 of the closed container 1.



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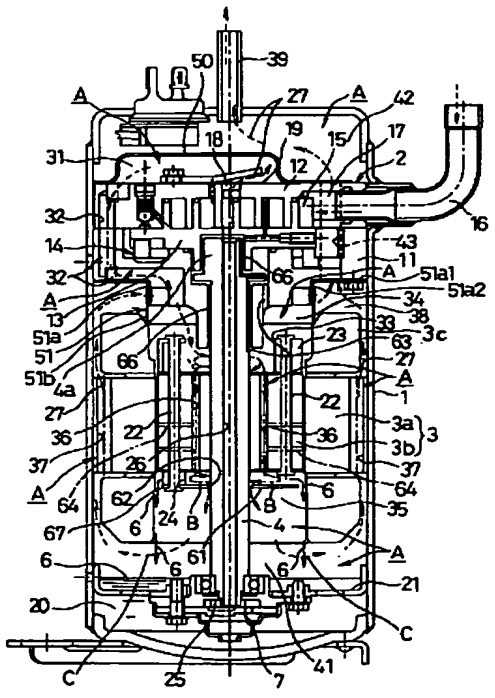
(54)【発明の名称】　密閉型圧縮機とその気液分離吐出方法

(57)【要約】
【課題】　冷媒およびオイルをほぼ拘束して取扱い、十分に気液分離されたガスを吐出できるようにする。
【解決手段】　圧縮機構２からの吐出ガス２７および圧縮機構２およびその軸受部６６への供給後のオイル６をほぼ拘束して回転子上部室３３から回転子通路３６に通して回転子下部室３５に導き回転子３ｂの回転による強制旋回に供して気液の遠心分離を行ない、オイルと分離されたガス２７を電動機下部室４１から固定子通路３７に通して前記拘束の領域外の固定子上部室３８に導き、密閉容器１の固定子上部室３８の位置以上の部分から密閉容器１外に吐出させることにより、上記の目的を達成する。



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【特許請求の範囲】

【請求項１】　密閉容器内に圧縮機構と、この圧縮機構の下方に設けた圧縮機構を駆動するための電動機と、この電動機の回転力を圧縮機構部に伝達するためのクランク軸と、密閉容器内の下部に設けたオイル溜めのオイルをクランク軸を通じてクランク軸の軸受部や圧縮機構摺動部に供給する給油機構とを備え、

圧縮機構から吐出されるガスが、圧縮機構の上部の容器内吐出室、この容器内吐出室から圧縮機構の下部に連通させる圧縮機構連通路、この圧縮機構連通路から回転子上部室に続く連絡路、回転子上部室と回転子下部室を連通させるように回転子に設けた回転子通路、回転子下部室、を順次経て電動機下に至り、さらに固定子の下部と上部とを連通させるように固定子または固定子と密閉容器との間に設けられた固定子通路を通って前記連絡路外まわりの固定子上部室に抜けた後、密閉容器の固定子上部室の位置以上の部分に設けられた外部吐出口を通って密閉容器外に吐出されるようにする容器内ガス通路を設けたことを特徴とする密閉型圧縮機。

【請求項２】　外部吐出口は密閉容器の固定子上部室に設けられている請求項１に記載の密閉型圧縮機。

【請求項３】　外部吐出口は密閉容器の圧縮機構上部室に設けられ、この圧縮機構上部室と前記固定子上部室とを連通させるように圧縮機構または圧縮機構と密閉容器との間に圧縮機構上昇連通路が設けられている請求項１に記載の密閉型圧縮機。

【請求項４】　回転子通路の断面積よりも固定子通路の断面積の方が大きい請求項１～３のいずれか１項に記載の密閉型圧縮機。

【請求項５】　連絡路は回転子通路の形成域よりも広域に形成している請求項１～４のいずれか１項に記載の密閉型圧縮機。

【請求項６】　回転子通路に回転子の外周に開口する１つまたはそれ以上の外向きの分岐穴を設けてある請求項１～５のいずれか１項に記載の密閉型圧縮機。

【請求項７】　圧縮機構上昇連通路と固定子通路との軸線は互いに位置ずれしている請求項３に記載の密閉型圧縮機。

【請求項８】　密閉容器内に圧縮機構と、この圧縮機構の下方に設けた圧縮機構を駆動するための電動機と、この電動機の回転力を圧縮機構部に伝達するためのクランク軸と、密閉容器内の下部に設けたオイル溜めのオイルをクランク軸を通じてクランク軸の軸受部や圧縮機構摺動部に供給する給油機構とを備え、

圧縮機構から吐出されるガスが、圧縮機構上部の容器内吐出室、この容器内吐出室と圧縮機構の下部を連通させる圧縮機構連通路、この圧縮機構連通路から回転子上部室まで続くように通路カバーで囲われた連絡路、回転子上部室と回転子下部室を連通させるように回転子に設けた回転子通路、回転子下部室、を順次経て電動機下に至り、さらに固定子の下部と上部とを連通させるように固定子または固定子と密閉容器との間に設けられた固定子通路を通って前記連絡路外まわりの固定子上部室に抜けた後、密閉容器の固定子上部室の位置以上の部分に設けられた外部吐出口を通って密閉容器外に吐出されるようにする容器内ガス通路を設けたことを特徴とする密閉型圧縮機。

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【請求項９】　容器内吐出室は、圧縮機構の上部吐出口を覆うように設けられたマフラーが形成している請求項８に記載の密閉型圧縮機。

【請求項１０】　通路カバーは、圧縮機構側から回転子上端の外周に設けられているバランスウエイト内側まで延びている請求項８、９のいずれか１項に記載の密閉型圧縮機。

【請求項１１】　通路カバーは、圧縮機構側から回転子上端に設けられているバランスウエイトの外側まで延びている請求項８、９のいずれか１項に記載の密閉型圧縮機。

【請求項１２】　通路カバーは、クランク軸の軸受部材の外まわりに設けた環状の軸受カバーである請求項８～１１のいずれか１項に記載の密閉型圧縮機。

【請求項１３】　軸受カバーは軸受部材との間に圧縮機構連通路の一部を形成している請求項１２に記載の密閉型圧縮機。

【請求項１４】　通路カバーは、その下端部が固定子とほぼ接するか、あるいは固定子または回転子と近接して、連絡路から固定子通路に流れるガスが途中で外部に流出するのを抑制するシール部を構成している請求項８～１３のいずれか１項に記載の密閉型圧縮機。

【請求項１５】　通路カバーは、バランスウエイトが形成している請求項８に記載の密閉型圧縮機。

【請求項１６】　密閉容器内に圧縮機構と、この圧縮機構の下方に設けた圧縮機構を駆動するための電動機と、この電動機の回転力を圧縮機構部に伝達するためのクランク軸と、密閉容器内の下部に設けたオイル溜めのオイルをクランク軸を通じてクランク軸の軸受部や圧縮機構摺動部に供給する給油機構とを備え、

圧縮機構から吐出されるガスが、圧縮機構の上部の容器内吐出室、この容器内吐出室と圧縮機構の下部を連通させる圧縮機構連通路、この圧縮機構連通路から回転子上部室まで続くように通路カバーで囲われた連絡路、回転子上部室と回転子下部室を連通させるように回転子に設けた回転子通路、回転子下部室、を順次経て電動機下に至り、さらに固定子の下部と上部とを連通させるように固定子または固定子と密閉容器との間に設けられた固定子通路を通って前記連絡路外まわりの固定子上部室に抜けた後、密閉容器の固定子上部室の位置以上の部分に設けられた外部吐出口を通って密閉容器外に吐出されるようにする容器内ガス通路を設け、回転子下部室に固定子通路からの吐出ガスを衝突させるオイル分離板を設けた

ことを特徴とする密閉型圧縮機。
【請求項１７】　分離板と回転子の下端との間の空間の円周上の少なくとも一部が側方へ開口している請求項１６に記載の密閉型圧縮機。
【請求項１８】　分離板はクランク軸との間に通路隙間を形成している請求項１７に記載の密閉型圧縮機。
【請求項１９】　通路隙間は回転子通路よりも内側にある請求項１８に記載の密閉型圧縮機。
【請求項２０】　前記連絡路内に圧縮機構およびその軸受部からのオイル排出路が開口している請求項１～１９のいずれか１項に記載の密閉型圧縮機。
【請求項２１】　オイル排出路は、前記圧縮機構連通路とは反対の側に設けられている請求項２０に記載の密閉型圧縮機。
【請求項２２】　密閉容器内に圧縮機構と、この圧縮機構の下方に設けた圧縮機構を駆動するための電動機と、この電動機の回転力を圧縮機構部に伝達するためのクランク軸と、密閉容器内の下部に設けたオイル溜めのオイルをクランク軸を通じてクランク軸の軸受部や圧縮機構摺動部に供給する給油機構とを備えた密閉型圧縮機の気液分離方法であって、
圧縮機構から密閉容器内へ吐出されるガスおよび圧縮機構およびその軸受部への供給後のオイルをほぼ拘束して回転子上部室から回転子通路に通して回転子下部室に導くことにより回転子の回転による強制旋回に供して気液の遠心分離を行ない、遠心分離により外側に向かうオイルは固定子の内周に付着して伝い落ち下部のオイル溜めへ滴下させる一方、オイルと分離された冷媒は電動機下部室から固定子または固定子と密閉容器との間の固定子通路に通して前記拘束域外回りの固定子上部室に導き、密閉容器の固定子上部室の位置以上の部分から密閉容器外に吐出させて、オイルと気液分離した冷媒ガスを吐出することを特徴とする密閉型圧縮機の気液分離吐出方法。
【請求項２３】　回転子通路を通るオイルにつき、回転子通路から回転子外周に開口する外向きの分岐穴による遠心排出を図る請求項２２に記載の密閉型圧縮機の気液分離吐出方法。
【請求項２４】　回転子通路から回転子下部室に吐出される冷媒ガスを分離板に衝突させて衝突分離を図る請求項２２、２３のいずれか１項に記載の密閉型圧縮機の気液分離吐出方法。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、業務用または家庭用、あるいは乗り物用の冷凍空調、あるいは冷蔵庫などに用いられる密閉型圧縮機に関するものである。
【０００２】
【従来の技術】従来、この種の密閉型圧縮機は、本実施の形態に係る密閉型のスクロール圧縮機を示す図１を参照して、密閉容器１内に圧縮機構２、この圧縮機構２の下方に設けた圧縮機構２を駆動するための電動機３と、この電動機３の回転力を圧縮機構２に伝達するためのクランク軸４とを備え、密閉容器１内の下部に設けたオイル溜め５のオイル６をクランク軸４を通じてクランク軸４の軸受部６６や圧縮機構２の摺動部に供給する給油機構７とを備えている。
【０００３】これによって、オイル６は給油機構７によって重力に逆らって軸受部６６や圧縮機構２の摺動部に強制給油されて、円滑な動作を確保しながら、圧縮機構２で圧縮した冷媒ガスを密閉容器１内の電動機３の部分を通して電動機３を冷却した後密閉容器１外に吐出するようにしており、前記軸受部６６や圧縮機構２の摺動部に供給した後のオイルが供給圧や重力によって下方に移動しオイル溜め２０に自然回収されるようにすることができる。しかし、冷媒ガスは常時オイルと接触してこれを随伴させ、密閉容器から冷凍サイクルに供給される際にオイルを持ち込んでしまい、冷凍サイクル中での配管圧力損失や凝縮器や蒸発器などの熱交換器での熱交換効率の低下をもたらす問題がある。
【０００４】これを解消するのに従来、圧縮機構から密閉容器内に吐出した冷媒ガスが電動機を通ってそれを冷却しながら密閉容器外に吐出されるまでの冷媒ガスの通路を、オイルの衝突分離や遠心分離が繰り返し生じるように設計して、密閉容器外に吐出される冷媒ガスにオイルが随伴しないように工夫したり、特開平７－１８９９６３号公報が開示しているように軸受部や圧縮機構から電動機部へのオイルの排出経路を、圧縮機構からの吐出冷媒の電動機部への流路から独立して設け、排出オイルは電動機の固定子の上に滴下させた後伝い落ちにより下部のオイル溜めに回収されるようにする一方、冷媒ガスは電動機部の片側に向け吐出して固定子と密閉容器との間の片側の通路を下降して電動機下部に至った後、固定子と回転子との間のエアギャップを上昇して密閉容器外に吐出する整然とした冷媒の流れを作って前記滴下し伝い落ちるオイルを随伴させにくくするようにしている。
【０００５】
【発明が解決しようとする課題】しかし、従来のどの方式も満足な気液分離はできていない。冷媒ガスの流れによる衝突分離や遠心分離を図る従来の方式は、圧縮機構や電動機の固定子に設ける冷媒通路の設け方によって冷媒ガスの流れを規制して各部との衝突や回転子やバランスウエイトの回転を利用した旋回流が生じるようにするものであるが、冷媒ガスやオイルの流れを拘束し切れず衝突や旋回が不十分であったり、冷媒がその流路や流れの乱れによってオイルと再三接触して随伴させやすかったりして、密閉容器外に吐出する冷媒ガスにオイルが混入することを防止し切れていない。
【０００６】また、上記公報に開示のものは、圧縮機構

やその軸受部に供給した後のオイルを集めて取扱うのでオイルが凝集し、電動機に向け流下ないしは滴下し、滴下する場合でもそのオイル滴は大きく、圧縮機構から電動機側に吐出されてくる冷媒ガスに乗じにくく随伴されにくい。しかし、滴下するオイルは電動機の固定子上部のコイル部など複雑な隙間や構造を持った部分に流下ないしは滴下して固定子下部の複雑な隙間や構造を持ったコイル部などへと伝い落ちて電動機下部のオイル溜めに至るので、せっかく独自に取扱われながら冷媒との接触域が長い上に、複雑な隙間および構造を持った固定子上下のコイル部を伝い落ちながらの冷媒ガスとの接触で、伝い落ちるオイルの一部は冷媒ガスにより分散されてその流れに乗じてしまい随伴されるので、やはり、密閉容器外に吐出する冷媒ガスにオイルが混入することを防止し切れていない。

【０００７】本発明の目的は、冷媒およびオイルをほぼ拘束して取扱って、十分に気液分離されたガスを吐出することができる密閉型圧縮機およびその気液分離吐出方法を提供することにある。

【０００８】

【課題を解決するための手段】本発明の密閉型圧縮機およびその気液分離吐出方法は、密閉容器内に圧縮機構と、この圧縮機構の下方に設けた圧縮機構を駆動するための電動機と、この電動機の回転力を圧縮機構部に伝達するためのクランク軸と、密閉容器内の下部に設けたオイル溜めのオイルをクランク軸を通じてクランク軸の軸受部や圧縮機構摺動部に供給する給油機構とを備えたことを基本構成とする密閉型圧縮機に関するものであり、上記の目的を達成するために、第１の密閉型圧縮機は、圧縮機構から吐出されるガスが、圧縮機構の上部の容器内吐出室、この容器内吐出室から圧縮機構の下部に連通させる圧縮機構連通路、この圧縮機構連通路から回転子上部室に続く連絡路、回転子上部室と回転子下部室を連通させるように回転子に設けた回転子通路、回転子下部室、を順次経て電動機下に至り、さらに固定子の下部と上部とを連通させるように固定子または固定子と密閉容器との間に設けられた固定子通路を通って前記連絡路外まわりの固定子上部室に抜けた後、密閉容器の固定子上部室の位置以上の部分に設けられた外部吐出口を通って密閉容器外に吐出されるようにする容器内ガス通路を設けたことを特徴としている。

【０００９】このような構成では、先ず、圧縮機構の上部の容器内吐出室と、この容器内吐出室と圧縮機構の下部を連通させる圧縮機構連通路とが、圧縮機構およびその軸受部の外回りに位置して、圧縮機構から吐出されるガスを一括して圧縮機構下部の連絡路に吐出させ、連絡路が吐出されてきたガスを回転子上部室に導いて回転子の回転子通路内を通り回転子下部室へ回転子の回転を受けた強い旋回流を持って吐出させる。このように圧縮機構から吐出されたガスを拘束して取扱うことにより、圧



縮機構から吐出されたガスが圧縮機構内や軸受部まわりを経る間にそれらに供給されていたオイルと接触してそれを随伴していても、前記強い旋回流によって気液分離を行ないオイルを外方へ追いやって電動機の固定子の内周に付着させてオイル溜めに近いところでガスから分離し、ガスに乗じる機会がほとんどなく伝い落ちて直ぐ下のオイル溜めに滴下し回収されるようにするので、ガスに随伴しているオイルを効率よく分離することができる。

【００１０】また、回転子通路を通るガスに随伴しているオイルは回転子の回転による遠心力で回転子通路の外側面に押し付けられてミスト状態から凝集しオイル滴に成長するので、前記遠心分離による気液分離効率をより高めるし、遠心分離されるオイル滴は固定子の内周に押し付けられて凝集しさらに大きく成長して下方のオイル溜めに滴下するので、気液分離後のオイルがオイル溜めに滴下するのに、回転子下部室から電動機下部室に至って後、上向きにユーターンして固定子通路に向かうガスの流れに乗じにくい上、前記ユーターンするガスの流れはユーターン時の遠心力により、随伴しているあるいは随伴しようとするオイルをその重力も手伝って下のオイル溜めに向け振り落としまた弾き飛ばす作用をするので、前記遠心分離した、およびまだガス中に残っているオイルの回収率を高めることができる。

【００１１】さらに、以上のようにしてオイルを分離されたガスは固定子通路を通って前記軸受まわりにある連絡路のさらに外まわりの固定子上部室に達して、密閉容器の固定子上部室以上の位置にある吐出口から吐出するようになるので、オイルやオイルを随伴しているガスと接触することなくオイルが十分に分離された状態で密閉容器外に吐出することができる。

【００１２】さらに、また、圧縮機構から吐出されたガスは回転子通路および固定子通路を通るので、電動機を効率よく冷却することができる。

【００１３】外部吐出口は密閉容器の固定子上部室に設けられてもよいが、外部吐出口が密閉容器の圧縮機構の上の容器外向け吐出室に設けられ、この容器外向け吐出室と前記固定子上部室とを連通させるように圧縮機構または圧縮機構と密閉容器との間に圧縮機構上昇連通路が設けられていると、ガスが固定子上部室から圧縮機構上昇連通路に入る際に圧縮機構部との間での衝突により、ガス中になお残存していることのあるオイルをさらに分離することができるので、オイルの分離効果が一層向上する。

【００１４】回転子通路の断面積よりも固定子通路の断面積の方が大きい構成では、遠心分離後密閉容器の上部へ吹き上げるガスの流速を低下させるので、オイルを随伴させる勢力を弱めて残留オイルや新たなオイルを吹き上げにくくし、オイルの分離効果を高めることができる。

【００１５】連絡路が回転子通路の形成域よりも広域に形成している構成では、圧縮機構下部に吐出されたガスを回転子通路に導きやすくなるので、吐出ガスの上記拘束による気液分離の確率が高くなりオイルの分離効果が高くなる。

【００１６】回転子通路に回転子の外周に開口する１つまたはそれ以上の外向きの分岐穴を設けた構成では、回転子の回転による遠心力で回転子通路の外側に押し付けられるオイルが前記分岐穴を通じ固定子外周に遠心排出されてガスからいち早く分離され固定子の内周に大きなオイル滴とし付着して伝い落ちるようになり、ガスが回転子通路から回転子下部室に吐出されて遠心分離されるのと併せ、オイルの分離効果を高めることができる。

【００１７】室外吐出室と固定子上部室とを連通させる圧縮機構上昇連通路と固定子連通路との軸線が互いにずれている構成では、固定子通路から固定子上部室に吐出されたガスが圧縮機構上昇通路に入るときの圧縮機構部との衝突を逃げなく強く行なわせるので、オイル分離効果を高めることができる。

【００１８】第２の密閉型圧縮機は、圧縮機構から吐出されるガスが、圧縮機構上部の容器内吐出室、この容器内吐出室から圧縮機構の下部に連通させる圧縮機構連通路、この圧縮機構連通路から回転子上部室まで続くように通路カバーで囲われた連絡路、回転子上部室と回転子下部室を連通させるように回転子に設けた回転子通路、回転子下部室、を順次経て電動機下に至り、さらに固定子の下部と上部とを連通させるように固定子または固定子と密閉容器との間に設けられた固定子通路を通って前記連絡路外まわりの固定子上部室に抜けた後、密閉容器の固定子上部室の位置以上の部分に設けられた外部吐出口を通って密閉容器外に吐出されるようにする容器内ガス通路を設けたことを特徴としている。

【００１９】このような構成では、圧縮機構から吐出されるガスを一括して圧縮機構下部の連絡路に吐出させ、連絡路が吐出されてきたガスを電動機の回転子上部室に導いて回転子の回転子通路内を通り回転子下部室へ回転子の回転を受けた強い旋回流を持って吐出させるのに、連絡路を通路カバーが形成して内外を仕切るので、第１の密閉型圧縮機に比して、圧縮機構からのガスを回転子上部空間に案内して回転子通路に入るように拘束しやすく、前記回転子の回転と旋回流とによるオイル分離を回避するガスの流れをなくしてオイル分離効果を高めることができるし、遠心分離後固定子上部空間に吹き上げ密閉容器外に吐出されるガスがオイル分離前のガスや連絡路内側に位置する軸受部からのオイルと接触するのを防止して新たにオイルが混入しないようにして吐出するガスのオイル分離効果を高めることができる。

【００２０】容器内吐出室が、圧縮機構の上部吐出口を覆うように設けられたマフラーにて形成されている構成では、圧縮機構上部室を利用した消音作用が得られるのに併せ、遠心分離後に固定子上部室に吹き上げたガスを圧縮機構部に衝突させてオイルを分離し圧縮機構上昇通路を通じて圧縮機構上部室に導き密閉容器外に吐出する場合、このオイル分離後密閉容器外に吐出するガスが圧縮機構から吐出されるオイル分離前のガスと接触するのを防止してオイル分離効果を高めることができる。

【００２１】通路カバーが、圧縮機構側から回転子上端の外周に設けられているバランスウエイト内側まで延びている構成、および、圧縮機構側から回転子上端に設けられているバランスウエイトの外側まで延びている構成では、圧縮機構から吐出されるガスを回転子通路にまで導く拘束性が増大し、その分オイル分離効果を高めることができる。

【００２２】通路カバーが、クランク軸の軸受部材の外まわりに設けた環状の軸受カバーであると、圧縮機構部およびその軸受部に供給されたオイルを通路カバーが形成する連絡路内に集めて吐出ガスとともに前記遠心分離に供されるように拘束することができ、かつ、遠心分離後に固定子上部室に吹き上げて密閉容器外に吐出されるガスが軸受部からのオイルやオイルを随伴している遠心分離前のガスと接触して新たにオイルを随伴するようなことを回避し、オイル分離効果を高めることができる。

【００２３】軸受カバーが軸受部材との間に圧縮機構連通路の一部を形成している構成では、圧縮機構から吐出され圧縮機構連通路を通じて圧縮機構下部に至ったガスを回転子上部空間に対応する密閉容器中央部の連絡路に導くのに軸受部材の外面を利用して通路を形成しやすい。

【００２４】通路カバーが、その下端部が固定子とほぼ接するか、あるいは固定子または回転子と近接して、連絡路から回転子通路に流れるガスが途中で外部に流出するのを抑制するシール部を構成した構成では、ガスおよびオイルを遠心分離に供する拘束性をさらに高めてオイルの分離効果を高めることができる。

【００２５】通路カバーは、バランスウエイトが形成するようにもできる。

【００２６】第３の密閉型圧縮機は、圧縮機構から吐出されるガスが、圧縮機構の上部の容器内吐出室、この容器内吐出室から圧縮機構の下部に連通させる圧縮機構連通路、この圧縮機構連通路から回転子上部室まで続くように通路カバーで囲われた連絡路、回転子上部室と回転子下部室を連通させるように回転子に設けた回転子通路、回転子下部室、を順次経て電動機下に至り、さらに固定子の下部と上部とを連通させるように固定子または固定子と密閉容器との間に設けられた固定子通路を通って前記連絡路外まわりの固定子上部室に抜けた後、密閉容器の固定子上部室の位置以上の部分に設けられた外部吐出口を通って密閉容器外に吐出されるようにする容器内ガス通路を設け、回転子下部室に固定子通路からの吐出ガスを衝突させるオイル分離板を設けたことを特徴と

している。

【００２７】このような構成では、回転子通路から回転子下部室に吐出された直後のガスを分離板に強く衝突させて、随伴しているオイルをよく分離し、またオイルのミストを液滴化しかつ成長させて直ぐ旋回による遠心分離に供することにより、また、分離板が回転子下部室に吐出されたガスの旋回領域を扁平に狭めて旋回速度を上げ遠心分離作用を高めることにより、第１、第２の密閉型圧縮機に比し、オイルの分離効果を高めることができる。

【００２８】分離板と回転子の下端との間の空間の円周上の少なくとも一部が側方へ開口していれば遠心分離ができ、バランスウエイトによって部分的に塞がれるようなことがあってもよい。

【００２９】分離板がクランク軸との間に通路隙間を形成している構成では、オイルと遠心分離されるガスをオイルの遠心分離方向とほぼ直角の中央部にある通路隙間を通じて電動機下部室に吐出することを促進し、遠心分離されるオイルが電動機下部室に吐出するガスに随伴するのを防止しやすくなるのでオイルの分離効果を高めることができる。

【００３０】通路隙間が回転子通路よりも内側にある構成では、通路隙間が回転子通路から回転子下部室に吐出されたガスが分離板との衝突を回避するバイパスとなるのを防止して、オイルの分離板による衝突分離効果が低下しないようにすることができる。

【００３１】前記連絡路内に圧縮機構およびその軸受部からのオイル排出路が開口している構成では、圧縮機構部およびその軸受部に供した後のオイルが連絡路外に流れてオイル分離後に密閉容器外に吐出されるガスと接触するのを防止しやすいので、オイルの分離効果を高めることができる。

【００３２】オイル排出路が、前記圧縮機構連通路とは反対の側に設けられている構成では、連絡路に流下し、または滴下するオイルが圧縮機構連通路から圧縮機構下部に吐出し連絡路に流れるガスによって飛散され、ミスト化するのを防止して、ガスと合わせて取扱いながらガスとの分離効率を高められる。

【００３３】上記第１～第３の密閉型圧縮機における作用は、以下のような密閉型圧縮機の気液分離吐出方法の発明としても実現することができる。その密閉型圧縮機の気液分離方法は、圧縮機構から密閉容器内へ吐出されるガスおよび圧縮機構およびその軸受部への供給後のオイルをほぼ拘束して回転子上部室から回転子通路に通して回転子下部室に導くことにより回転子の回転による強制旋回に供して気液の遠心分離を行ない、遠心分離により外側に向かうオイルは固定子の内周に付着し伝い落ちるようにして直ぐ下のオイル溜めに滴下させる一方、オイルと分離された冷媒は電動機下部室から固定子または固定子と密閉容器との間の固定子通路に通して前記拘束の領域外の固定子上部室に導き、密閉容器の固定子上部室の位置以上の部分から密閉容器外に吐出させて、オイルと気液分離した冷媒ガスを吐出することを特徴としている。

【００３４】この場合も、回転子通路を通るオイルにつき、回転子通路から回転子外周に向け分岐した分岐穴による遠心排出を図ることができるし、回転子通路から回転子下部室に吐出される冷媒ガスを分離板に衝突させて衝突分離を図ることもできる。

【００３５】本発明のそれ以上の目的及び特徴は、以下の詳細な説明及び図面によって明らかになる。本発明の各特徴は、可能な限りにおいて、それ単独で、あるいは種々な組み合わせで複合して用いることができる。

【００３６】

【発明の実施の形態】以下、本発明における実施の形態に係る密閉型圧縮機およびその気液分離吐出方法について図を参照しながら説明し、本発明の理解に供する。

【００３７】本実施の形態は縦型でスクロール式の圧縮機構を内蔵した冷凍サイクル用の密閉型圧縮機の場合の一例であり、圧縮対象は冷媒ガスである。しかし、本発明はこれに限られることはなく、ロータリ式の圧縮機構など各種の圧縮機構をそれを駆動する電動機とともに密閉容器内に内蔵したガス一般を対象として圧縮し、圧縮機構が密閉容器内を上下に仕切り、その下部に電動機を収容する密閉型圧縮機であればその全般に適用して有効であり、本発明の範疇に属する。

【００３８】本実施の形態の密閉型圧縮機は図１～図３に示すように、密閉容器１内に溶接や焼き嵌めなどして固定したクランク軸４の主軸受部材１１と、この主軸受部材１１上にボルト止めした固定スクロール１２との間に、固定スクロール１２と噛み合う旋回スクロール１３を挟み込んでスクロール式の圧縮機構２を構成し、旋回スクロール１３と主軸受部材１１との間に旋回スクロール１３の自転を防止して円軌道運動するように案内するオルダムリングなどによる自転規制機構１４を設けて、クランク軸４の上端にある主軸部４ａにて旋回スクロール１３を偏心駆動することにより旋回スクロール１３を円軌道運動させ、これにより固定スクロール１２と旋回スクロール１３との間に形成している圧縮室１５が外周側から中央部に移動しながら小さくなるのを利用して、密閉容器１外に通じた吸入パイプ１６および固定スクロール１２の外周部の吸入口１７から冷媒ガスを吸入して圧縮していき所定圧以上になった冷媒ガスは固定スクロール１２の中央部の吐出口１８からリード弁１９を押し開いて密閉容器１内に吐出させることを繰り返す。

【００３９】クランク軸４の下端は密閉容器１の下端部のオイル溜め２０に達して、密閉容器１内に溶接や焼き嵌めして固定された副軸受部材２１により軸受され、安定に回転することができる。電動機３は主軸受部材１１と副軸受部材２１との間に位置して、密閉容器１に溶接

や焼き嵌めなどして固定された固定子３ａと、クランク軸４の途中の外まわりに一体に結合された回転子３ｂとで構成され、回転子３ｂの上下端面の外周部分にはピン２２により止め付けられたバランスウエイト２３、２４が設けられ、これにより回転子３ｂおよびクランク軸４が安定して回転し、旋回スクロール１３を安定して円軌道運動させることができる。

【００４０】給油機構７はクランク軸４の下端で駆動されるポンプ２５によってオイル溜め２０内のオイル６をクランク軸４を通縦しているオイル供給穴２６を通じて圧縮機構２の各部の軸受部６６や圧縮機構２の各摺動部に供給する。供給後のオイル６は供給圧や重力によって逃げ場を求めるようにして軸受部６６を通じ主軸受部材１１の下に流出して滴下し、最終的にオイル溜め２０に回収される。

【００４１】しかし、実際には既述したように、圧縮機構２から吐出される図１に破線矢印で示す冷媒ガス２７には圧縮機構２内で接触したオイル６を随伴させていたり、上記主軸受部材１１の下に滴下してくる供給後のオイル６を飛散させて随伴させたりしていて、従来これを十分に分離できず密閉容器１外に吐出する冷媒ガスとともにオイルも吐出されてしまう問題がある。

【００４２】図１～図３に示す各実施の形態はこのような問題を解消するために、圧縮機構２から吐出される冷媒ガス２７が、圧縮機構２の上部の容器内吐出室３１、この容器内吐出室３１と圧縮機構２の下部を連通させる圧縮機構連通路３２、この圧縮機構連通路３２から回転子上部室３３に続く連絡路３４、回転子上部室３３と回転子下部室３５を連通させるように回転子３ｂに設けた回転子通路３６、回転子下部室３５、を順次経て電動機３の下に至り、さらに固定子３ａの下部と上部とを連通させるように固定子３ａまたは固定子３ａと密閉容器１との間に設けられた固定子通路３７を通って前記連絡路３４の外まわりの固定子上部室３８に抜けた後、密閉容器１の固定子上部室３８の位置以上の部分に設けられた外部吐出パイプ３９を通って密閉容器１外に吐出されるようにする容器内ガス通路Ａを設けてある。

【００４３】このような容器内ガス通路Ａの容器内吐出室３１と、圧縮機構連通路３２とは、圧縮機構２およびその軸受部６６の外回りに位置して、圧縮機構２から吐出される冷媒ガス２７を一括して圧縮機構２の下部の連絡路３４に吐出させる。続いて連絡路３４は吐出されてきた冷媒ガス２７を回転子上部室３３に導いて回転子３ｂおよびバランスウエイト２３の回転による影響で緩く旋回する状態で回転子通路３６内に進入させて下方に通りぬけ回転子下部室３５へ回転子３ｂの回転を受けた強い旋回流Ｂを持って吐出させる。

【００４４】このように圧縮機構２から吐出された冷媒ガス２７を拘束して取扱うことにより、圧縮機構２から吐出された冷媒ガス２７が圧縮機構２内や軸受部６６まわりを経る間にそれらに供給されていたオイル６と接触してそれを随伴していても、前記強い旋回流Ｂによって気液分離を行ないオイル６を外方へ追いやって固定子３ａの内周に付着させてオイル溜め２０に近いところで冷媒ガス２７から実線矢印で示すように効果的に分離し、以降分離したオイル６は伝い落ちながら直ぐ下のオイル溜めに滴下して、冷媒ガス２７に乗じる機会がほとんどなしに回収されるようにするので、冷媒ガス２７に随伴しているオイル６を効率よく分離し回収することができる。

【００４５】また、回転子通路３６を通る冷媒ガス２７に随伴しているオイル６は回転子３ｂの回転による遠心力で回転子通路３６の外側面に押し付けられてミスト状態から凝集しオイル滴に成長するので、前記遠心分離による気液分離効率をより高めるし、遠心分離されるオイル滴は固定子３ａの内周に押し付けられて凝集しさらに大きく成長して下方のオイル溜め２０に滴下するので、気液分離後のオイル６がオイル溜め２０に滴下するのに、回転子下部室３５から電動機下部室４１に至って後、上向きにユーターンして固定子通路３７に向かう冷媒ガス２７の流れＣに乗じにくい上、前記ユーターンする冷媒ガス２７の流れＣはユーターン時の遠心力により、随伴しているあるいは随伴しようとするオイル６をその重力も手伝って下のオイル溜め２０に向け振り落とし、また弾き飛ばす作用をするので、前記遠心分離した、また冷媒ガス２７中になお残っているオイル６の回収率を高めることができる。

【００４６】以上のようにしてオイル６を分離された冷媒ガス２７は、固定子通路３７を通って前記軸受部６６まわりにある連絡路３４のさらに外まわりの固定子上部室３８に達して、密閉容器１の固定子上部室３８の位置以上の部分にある外部吐出パイプ３９から密閉容器１外に吐出するので、オイル６を随伴している冷媒ガス２７と接触することなくオイルが十分に分離された状態で密閉容器１外に吐出して冷凍サイクルに供給することができる。従って、冷凍サイクル中での配管圧力損失や凝縮器、蒸発器などの熱交換器での熱交換効率の低下を防止することができる。しかも、圧縮機構２から吐出された冷媒ガス２７は回転子通路３６および固定子通路３７を通るので、電動機３を効率よく冷却することができる。

【００４７】外部吐出パイプ３９は密閉容器１の固定子上部室３８に設けられてもよいが、外部吐出パイプ３９を図示するように密閉容器１の圧縮機構２の上の圧縮機構上部室４２に設け、この圧縮機構上部室４２と前記固定子上部室３８とを連通させるように圧縮機構２または圧縮機構２と密閉容器１との間に圧縮機構上昇連通路４３を設けていることにより、冷媒ガス２７が固定子上部室３８から圧縮機構上昇連通路４３に入る際に圧縮機構２部との間での衝突により、冷媒ガス２７中になお残存しているオイル６をさらに分離することができるので、

オイル６の分離効果が一層向上する。

【００４８】また、回転子通路３６の総断面積よりも固定子通路３７の総断面積の方が大きくなるようにしてある。これにより、遠心分離後に固定子上部室３８へ吹き上げる冷媒ガス２７の流速を低下させるので、オイル６を随伴させる勢力を弱めて残留しておりあるいは新たに接触するオイル６を吹き上げにくくし、オイル６の分離効果を高めることができる。

【００４９】さらに、圧縮機構上昇連通路４３と固定子通路３７との軸線が互いにずれるようにしている。これにより、固定子通路３７から固定子上部室３８に吐出された冷媒ガス２７が圧縮機構上昇連通路４３に入るときの圧縮機構２部との衝突を逃げなく強く行なわせるので、オイル分離効果を高めることができる。このため、軸線の位置ずれは大きいほどよく、図示はしていないが円周方向に位置ずれさせるとずれ量を大きく設定することができる。

【００５０】容器内吐出室３１は図示するように、圧縮機構２の上部吐出口１８を覆うように設けられたマフラー５０にて形成している。これにより、圧縮機構上部室４２を利用した消音作用が得られるのに併せ、遠心分離後に固定子上部室３８に吹き上げた冷媒ガス２７を圧縮機構２部に衝突させてオイル６をさらに分離し圧縮機構上昇連通路４３を通じて圧縮機構上部室４２に導き密閉容器１外に吐出する上記構造において、このオイル分離後に密閉容器１外に吐出する冷媒ガス２７が圧縮機構上部室４２内で圧縮機構２から吐出されるオイル分離前の冷媒ガス２７と接触するのを防止してオイル分離効果を高めることができる。

【００５１】前記連絡路３４は冷媒ガス２７の流路を決められれば開放型でもよいが、本実施の形態では図に示すように通路カバー５１で囲って形成してある。これにより、連絡路３４が圧縮機構２の下部に吐出された冷媒ガス２７を確実に拘束して回転子通路３６に導きやすくなるので、吐出冷媒ガス２７の上記拘束による気液分離の確率が高くなりオイルの分離効果が高くなる。また、通路カバー５１は連絡路３４の内外を仕切っていて、オイルを分離され固定子上部室３８に吐出されてくる冷媒ガス２７がオイル分離前の冷媒ガス２７と接触したり軸受部６６から流下してくるオイル６と接触したりするのを防止するので、密閉容器１外に吐出されるまでに新たにオイル６を随伴させるようなことをなくしてオイル分離効果を高めることができる。冷媒ガス２７の連絡路３４による拘束は連絡路３４が圧縮機構連通路３２から回転子通路３６に続くようにするのが好適である。

【００５２】この意味で、通路カバー５１が図１に示す場合のように、その下端部が固定子３ａとほぼ接するか、あるいは固定子３ａまたは回転子３ｂと近接して、連絡路３４から回転子通路３６に流れる冷媒ガス２７が途中で外部に流出するのを抑制するシール部を構成することにより、冷媒ガス２７およびオイル６を遠心分離に供する拘束性をさらに高めてオイル６の分離効果を高めることができる。

【００５３】通路カバー５１が、図２に示すように圧縮機構２側から回転子３ｂの上端の外周に設けられているバランスウエイト２３の内側まで延びている構成、および、図３に示すように圧縮機構２側からバランスウエイト２３の外側まで延びていることによっても、圧縮機構２から吐出される冷媒ガスを回転子通路３６にまで導く拘束性が増大し、その分オイル分離効果を高めることができる。

【００５４】特に、通路カバー５１は主軸受部材１１の外まわりに設けた環状の軸受カバーとしてあり、圧縮機構２部およびその軸受部６６に供給されたオイル６を通路カバー５１が形成する連絡路３４内に集めて冷媒ガス２７とともに前記遠心分離に供されるように拘束することができ、かつ、遠心分離後に固定子上部室３８に吹き上げて密閉容器１外に吐出される冷媒ガス２７がオイル６を随伴している遠心分離前の冷媒ガス２７と接触して新たにオイル６を随伴するようなことを回避し、オイル分離効果を高めることができる。

【００５５】通路カバー５１は主軸受部材１１にフランジ部５１ａ１をボルト止めした金属製の軸受カバー５１ａとこの軸受カバー５１ａの内周に形成している下向きの筒部５１ａ２に継ぎ足した絶縁材料よりなる筒カバー５１ｂとで構成している。特に、図１～図３に示すように通路カバー５１が主軸受部材１１との間に圧縮機構２の圧縮機構連通路３２の一部を形成するのに金属製の軸受カバー５１ａは耐久性において好適であり、このような通路構成では、圧縮機構２から吐出され圧縮機構連通路３２を通じて圧縮機構２の下部に至った冷媒ガス２７を回転子上部室３３に対応する密閉容器１の中央部の連絡路３４に導くのに主軸受部材１１の外面を利用して通路を形成しやすい。また、通路カバー５１が図１、図３に示すように固定子３ａのコイル部３ｃに接触し、また近接する場合にその部分が絶縁性の筒カバー５１ｂであることにより互いの電気的な影響がなくなるので好適である。筒カバー５１ｂの材料としてはＰＥＴやテフロン（登録商標）製のシートなどがあり、これらはかさ張らないしコイル部３ｃと接触してもそれを傷めない利点がある。

【００５６】しかし、通路カバー５１は、図示しないがバランスウエイト２３によって形成することもでき、これによると、通路カバー５１を設けるのに特別な部材および取りつけ構造が不要となる。

【００５７】さらに、図１～図３に示すように、回転子下部室３５に回転子通路３６から吐出される冷媒ガス２７を衝突させてオイル６を分離する分離板６１を設けてある。分離板６１は円形でバランスウエイト２４と共にバランスウエイト２４をスペーサとして回転子３ｂに取

りつけられている。これにより、回転子通路３６から回転子下部室３５に吐出された直後の冷媒ガス２７が分離板６１に強く衝突して、随伴しているオイル６をよく分離し、またオイル６のミストを液滴化しかつ成長させて直ぐ旋回による遠心分離に供することにより、また、分離板６１が回転子下部室３５に吐出された冷媒ガス２７の旋回領域を扁平に狭めて旋回速度を上げ遠心分離作用を高めることにより、オイル６の分離効果を高めることができる。

【００５８】分離板６１と回転子３ｂの下端との間の空間の円周上の少なくとも一部が側方へ開口していれば遠心分離ができ、バランスウエイト２４によって部分的に塞がれるようなことがあってもよい。

【００５９】分離板６１はまたクランク軸４との間にガスの通路隙間６２を形成しているので、オイル６と遠心分離される冷媒ガス２７をオイル６の遠心分離方向とほぼ直角の中央部にある通路隙間６２を通じて電動機下部室４１に吐出することを促進し、遠心分離されるオイル６が電動機下部室４１に吐出する冷媒ガス２７に随伴するのを防止しやすくなるのでオイルの分離効果を高めることができる。当然、分離板６１と固定子３ａの内周との間にも通路隙間が設けられ、遠心分離されたオイル６が固定子３ａの内面を伝い落ちれるようにする。

【００６０】また、前記通路隙間６２が図１～図３に示すように回転子通路３６よりも内側にあるので、通路隙間６２が回転子通路３６から回転子下部室３５に吐出された冷媒ガス２７が分離板６１との衝突を回避するバイパスとなるのを防止して、オイル６の分離板６１による衝突分離効果が低下しないようにすることができる。

【００６１】さらに、図１に示すものは連絡路３４内に軸受部６６からのオイル排出路６３が開口している。これにより、圧縮機構２部およびその軸受部６６に供した後のオイル６が連絡路外に流れてオイル分離後に密閉容器１外に吐出される冷媒ガス２７と接触するのを防止しやすいので、オイル６の分離効果を高めることができる。

【００６２】しかも、このオイル排出路６３が、圧縮機構連通路３２とは反対の側に設けられているので、連絡路３４に流下し、または滴下するオイル６が圧縮機構連通路３２から圧縮機構２の下部に吐出し連絡路３４に流れる冷媒ガス２７によって飛散され、ミスト化するのを防止して、冷媒ガス２７と合わせて取扱いながら冷媒ガス２７との分離効率を高められる。

【００６３】なお、図１に仮想線で示すように回転子通路３６に回転子３ｂの外周に開口する１つまたはそれ以上の外向きの分岐穴６４を設けると、回転子３ｂの回転による遠心力で回転子通路３６の外側に押し付けられるオイル６が前記分岐穴６４を通じ回転子３ｂの外周から遠心排出されて冷媒ガス２７からいち早く分離され固定子３ａの内周に大きなオイル滴をなして付着し伝い落ちるようになり、冷媒ガス２７が回転子通路３６から回転子下部室３５に吐出されて遠心分離されるのと併せ、オイル６の分離効果を高めることができる。

【００６４】

【発明の効果】本発明によれば、上記の説明で明らかなように、圧縮機構からの吐出ガスおよびそれに乗じて随伴している圧縮機構およびその軸受部に供給した後のオイルをほぼ拘束して取扱い、回転子通路を通すことで回転子の回転による強い遠心分離に供して効率のよい遠心分離を行って後、電動機下部室でのガスのユーターンとそれによるオイルの遠心分離を伴い固定子通路から固定子上部室に至らせながら、圧縮機構から回転子通路に入るオイル分離前のガスとの接触を防止して密閉容器外に吐出することが主因となって、電動機部に吐出がスを回して冷却を図りながらオイルを十分に分離したガスを密閉容器外に吐出し供給することができる。

【図面の簡単な説明】

【図１】本発明の実施の形態に係る１つの密閉型圧縮機を示す断面図である。

【図２】本発明の実施の形態に係る今１つの密閉型圧縮機を示す断面図である。

【図３】本発明の実施の形態に係る別の密閉型圧縮機を示す断面図である。

【符号の説明】

１　密閉容器
２　圧縮機構
３　電動機
３ａ　固定子
３ｂ　回転子
４　クランク軸
６　オイル
７　給油機構
１７　吸入口
１８　吐出口
２０　オイル溜め
２３、２４　バランスウエイト
２７　冷媒ガス
３１　容器内吐出室
３２　圧縮機構連通路
３３　回転子上部室
３４　連絡路
３５　回転子下部室
３６　回転子通路
３７　固定子通路
３８　固定子上部室
３９　外部吐出パイプ
４１　電動機下部室
４２　圧縮機構上部室
４３　圧縮機構上昇連通路
４０　油回収通路

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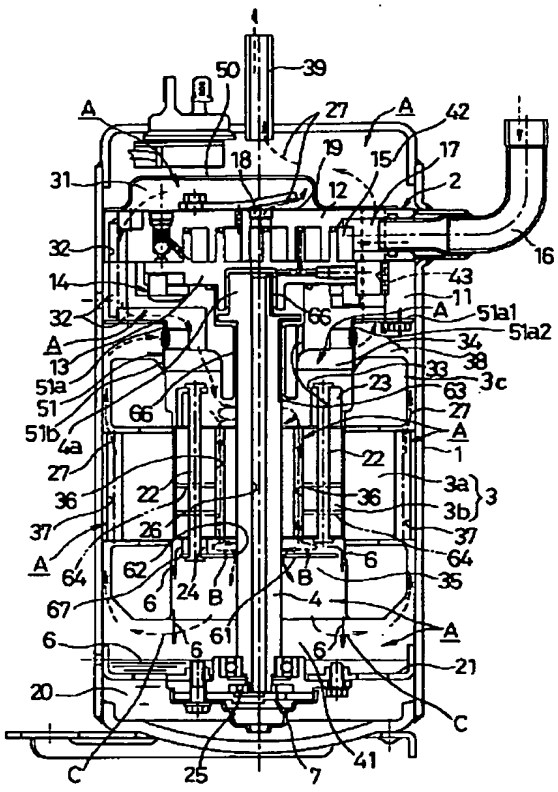
５０　マフラー
５１　通路カバー（軸受カバー）
６１　分離板
６２　通路隙間

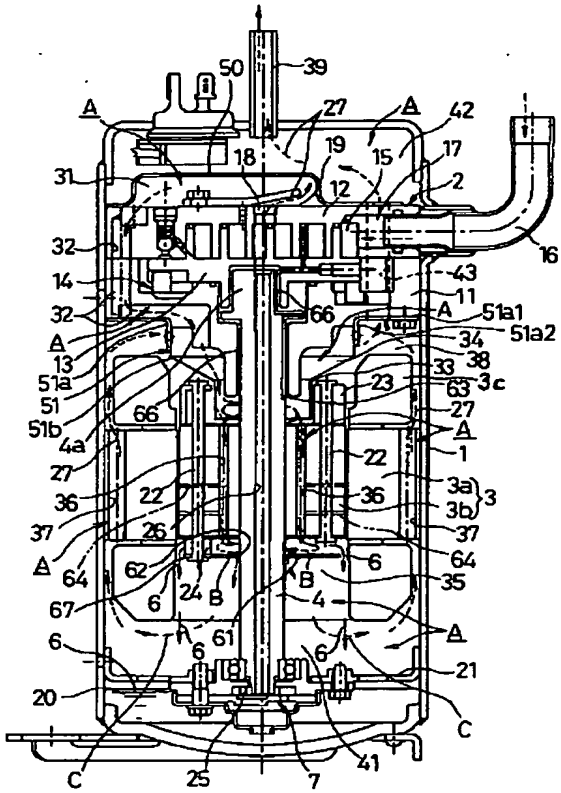
18

＊６３　オイル排出路
６４　分岐穴
６６　軸受部
＊

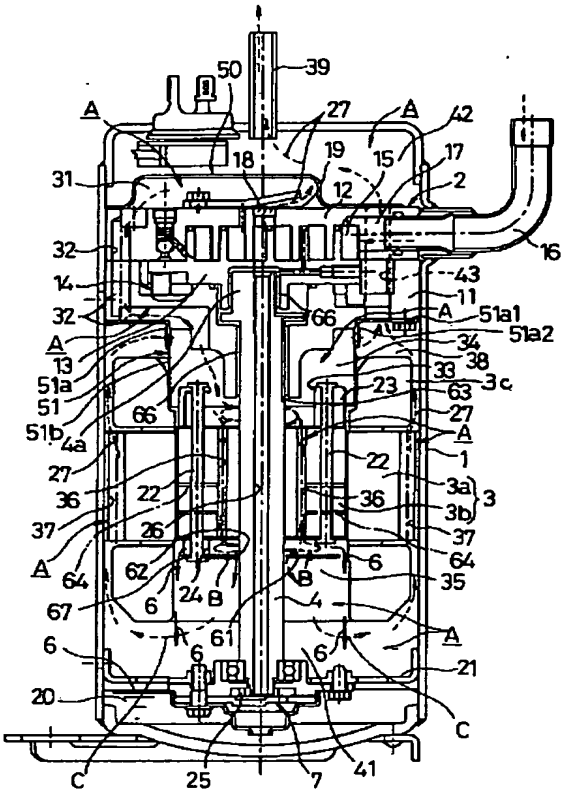
【図１】




【図２】



【図３】

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BD08 BD13 BH06 CA01 CA02
CC11 CD01 CE02 CE03 CF04

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[Claim(s)]

[Claim 1]A closed compressor comprising:

It is a compressor style in a well-closed container.

An electric motor for driving a compressor style which this compressor style provided caudad.

A crankshaft for transmitting torque of this electric motor to a compression mechanism part.

It has a lubrication mechanism which supplies oil of an oil sump provided in the lower part in a well-closed container to a bearing part and a compressor style sliding part of a crankshaft through a crankshaft, A compressor style communicating path which gas breathed out from a compressor style makes the lower part of a compressor style open for free passage from a regurgitation room in a container of the upper part of a compressor style, and this regurgitation room in a container, A communication passage which follows a rotator upper chamber from this compressor style communicating path, a rotor passage established in a rotator so that a rotator upper chamber and a rotator lower room might be made to open for free passage, After escaping through a stator passage provided between a stator or a stator, and a well-closed container to a stator upper chamber of a circumference of outside of said communication passage so that it may result under an electric motor through a rotator lower room one by one and the lower part and the upper part of a stator may be made to open for free passage further, A gas passageway in a container breathed out out of a well-closed container through an external delivery established in a portion beyond a position of a stator upper chamber of a well-closed container.

[Claim 2]The closed compressor according to claim 1 with which an external delivery is established in a stator upper chamber of a well-closed container.

[Claim 3]The closed compressor according to claim 1 with which an external delivery is established in a compressor style upper chamber of a well-closed container, and a compressor style rise communicating path is provided between a compressor style or a compressor style, and a well-closed container so that this compressor style upper chamber and said stator upper

chamber may be made to open for free passage.
[Claim 4]A closed compressor given in any 1 paragraph of claims 1-3 with the larger cross-section area of a stator passage than a cross-section area of a rotor passage.
[Claim 5]A closed compressor given in any 1 paragraph of claims 1-4 which form a communication passage in a wide area rather than a formation region of a rotor passage.
[Claim 6]A closed compressor given in any 1 paragraph of claims 1-5 which have established one or an outward branching hole beyond it which carries out an opening to a periphery of a rotator in a rotor passage.
[Claim 7]The closed compressor according to claim 3 which is carrying out the position gap of the axis of a compressor style rise communicating path and a stator passage mutually.
[Claim 8]A closed compressor comprising:
It is a compressor style in a well-closed container.
An electric motor for driving a compressor style which this compressor style provided caudad.
A crankshaft for transmitting torque of this electric motor to a compression mechanism part.
It has a lubrication mechanism which supplies oil of an oil sump provided in the lower part in a well-closed container to a bearing part and a compressor style sliding part of a crankshaft through a crankshaft, A compressor style communicating path where gas breathed out from a compressor style makes the lower part of a regurgitation room in a container of the compressor style upper part, this regurgitation room in a container, and a compressor style open for free passage, A communication passage enclosed with passage covering so that it might continue from this compressor style communicating path to a rotator upper chamber, A rotor passage established in a rotator so that a rotator upper chamber and a rotator lower room might be made to open for free passage, After escaping through a stator passage provided between a stator or a stator, and a well-closed container to a stator upper chamber of a circumference of outside of said communication passage so that it may result under an electric motor through a rotator lower room one by one and the lower part and the upper part of a stator may be made to open for free passage further,
A gas passageway in a container breathed out out of a well-closed container

through an external delivery established in a portion beyond a position of a stator upper chamber of a well-closed container.

[Claim 9]The closed compressor according to claim 8 which a muffler provided so that a regurgitation room in a container might cover an upper exhaust port of a compressor style forms.
[Claim 10]A closed compressor given in any 1 paragraph of claims 8 and 9 to which passage covering has extended to the balance weight inside provided in a periphery of a rotator upper bed from the compressor style side.
[Claim 11]A closed compressor given in any 1 paragraph of claims 8 and 9 to which passage covering has extended to the outside of a balance weight provided in a rotator upper bed from the compressor style side.
[Claim 12]A closed compressor given in any 1 paragraph of claims 8-11 which are the annular bearing covers which provided passage covering in the surroundings outside a bearing member of a crankshaft.
[Claim 13]The closed compressor according to claim 12 with which a bearing cover forms a part of compressor style communicating path between bearing members.
[Claim 14]A closed compressor given in any 1 paragraph of claims 8-13 for which passage covering constitutes a seal part for which it controls that the lower end part approaches with a stator or a rotator almost in contact with a stator, and gas which flows into a stator passage flows out of a communication passage outside on the way.
[Claim 15]The closed compressor according to claim 8 with which a balance weight forms passage covering.
[Claim 16]A closed compressor comprising:
It is a compressor style in a well-closed container.
An electric motor for driving a compressor style which this compressor style provided caudad.
A crankshaft for transmitting torque of this electric motor to a compression mechanism part.
It has a lubrication mechanism which supplies oil of an oil sump provided in the lower part in a well-closed container to a bearing part and a compressor style sliding part of a crankshaft through a crankshaft, A compressor style communicating path where gas breathed out from a compressor style makes the lower part of a regurgitation room in a container

of the upper part of a compressor style, this regurgitation room in a container, and a compressor style open for free passage, A communication passage enclosed with passage covering so that it might continue from this compressor style communicating path to a rotator upper chamber, A rotor passage established in a rotator so that a rotator upper chamber and a rotator lower room might be made to open for free passage, After escaping through a stator passage provided between a stator or a stator, and a well-closed container to a stator upper chamber of a circumference of outside of said communication passage so that it may result under an electric motor through a rotator lower room one by one and the lower part and the upper part of a stator may be made to open for free passage further, An oil separation board which provides a gas passageway in a container breathed out out of a well-closed container through an external delivery established in a portion beyond a position of a stator upper chamber of a well-closed container, and makes discharged gas from a stator passage collide with a rotator lower room.

[Claim 17]The closed compressor according to claim 16 in which at least a part on the circumference of space between a division plate and a lower end of a rotator is carrying out the opening to the side.
[Claim 18]The closed compressor according to claim 17 with which a division plate forms a passage crevice between crankshafts.
[Claim 19]The closed compressor according to claim 18 which a passage crevice has inside a rotor passage.
[Claim 20]A closed compressor given in any 1 paragraph of claims 1-19 in which a compressor style and oil exhaust passage from the bearing part are carrying out the opening into said communication passage.
[Claim 21]The closed compressor according to claim 20 with which oil exhaust passage is established in the opposite side with said compressor style communicating path.
[Claim 22]It is a compressor style in a well-closed container.
An electric motor for driving a compressor style which this compressor style provided caudad.
A crankshaft for transmitting torque of this electric motor to a compression mechanism part.
A lubrication mechanism which supplies oil of an oil sump provided in the

lower part in a well-closed container to a bearing part and a compressor style sliding part of a crankshaft through a crankshaft.
It is a vapor-liquid-separation discharging method of a closed compressor provided with the above, By restraining mostly oil after supply to gas breathed out into a well-closed container from a compressor style, a compressor style, and its bearing part, letting it pass from a rotator upper chamber to a rotor passage, and leading to a rotator lower room, present compulsive revolution by rotation of a rotator and vapor-liquid is centrifuged, While oil which goes outside by centrifugal separation adheres and is transmitted to inner circumference of a stator and is made dropped at an oil sump of the omission lower part, Let oil and a separated refrigerant pass from an electric motor lower room to a stator passage between a stator or a stator, and a well-closed container, and it is led to a stator upper chamber of a circumference of said area outside restricted, It is made to breathe out out of a well-closed container from a portion beyond a position of a stator upper chamber of a well-closed container, and the regurgitation of the refrigerant gas which carried out vapor liquid separation to oil is carried out.

[Claim 23]A vapor-liquid-separation discharging method of the closed compressor according to claim 22 which aims at centrifugal discharge by an outward branching hole which carries out an opening to a rotator periphery from a rotor passage about oil passing through a rotor passage.
[Claim 24]A vapor-liquid-separation discharging method of a closed compressor given in any 1 paragraph of claims 22 and 23 which make a refrigerant gas breathed out by rotator lower room from a rotor passage collide with a division plate, and aim at collision separation.
[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the closed compressor used for business use, home use, the frozen air conditioning for vehicles, or a refrigerator. [0002]
[Description of the Prior Art]This kind of closed compressor refers to drawing 1 in which the scroll compressor of the encapsulated type concerning this embodiment is shown conventionally, The electric motor 3 for driving the compressor style 2 and the compressor style 2 which this compressor

style 2 provided caudad in the well-closed container 1, It had the crankshaft 4 for transmitting the torque of this electric motor 3 to the compressor style 2, and has the lubrication mechanism 7 which supplies the oil 6 of the oil sump 5 provided in the lower part in the well-closed container 1 through the crankshaft 4 to the bearing part 66 of the crankshaft 4, or the sliding part of the compressor style 2.

[0003]Force feed of the oil 6 being carried out to the bearing part 66 or the sliding part of the compressor style 2 by the lubrication mechanism 7 against gravity, and securing smooth operation by this. After cooling the electric motor 3 through the portion of the electric motor 3 in the well-closed container 1, it is made to carry out the regurgitation of the refrigerant gas compressed at compressor guard 2 out of the well-closed container 1. With a supply pressure or gravity, oil after supplying said bearing part 66 and the sliding part of the compressor style 2 moves caudad, and can be automatically collected by the oil sump 20. However, always contact oil and this is made to go together, when a refrigerant gas is supplied to a refrigerating cycle from a well-closed container, it carries in oil, and it has a problem which brings about decline in the heat exchanging efficiency in heat exchangers, such as the piping pressure loss and the condenser in the inside of a refrigerating cycle, and an evaporator.

[0004]It designs collision separation of oil and centrifugal separation repeat the passage of a refrigerant gas although this is canceled, while the refrigerant gas breathed out in the well-closed container cools it through an electric motor conventionally from a compressor style, until it is breathed out out of a well-closed container, and produce, Devise so that oil may not accompany to the refrigerant gas breathed out out of a well-closed container, or, As JP,7-189963,A is indicating the discharge path of the oil from a compressor style to a bearing part or an electric motor part, Provide independently from the channel to the electric motor part of the discharged refrigerant from a compressor style, and while exhaust oil is collected by the backward along omission made dropped on the stator of an electric motor at a lower oil sump, After carrying out the regurgitation of the refrigerant gas towards one side of an electric motor part, descending the passage of one side between a stator and a well-closed container and resulting in the electric motor lower part, The

air gap between a stator and a rotator is gone up, and it is made like carrying out that make the flow of the orderly refrigerant which carries out the regurgitation, and it is hard to make said oil which trickles, and is transmitted and falls go together out of a well-closed container.

[0005]

[Problem(s) to be Solved by the Invention]However, vapor liquid separation with every conventional satisfactory method is not made. Although it is made for the turning stream which regulated the flow of the refrigerant gas and used rotation of the collision with each part, a rotator, or a balance weight depending on how to provide the refrigerant passage established in the stator of a compressor style or an electric motor to produce the conventional method which aims at the collision separation and centrifugal separation by the flow of a refrigerant gas, The flow of a refrigerant gas or oil is restrained and it does not go out, and a collision and revolution are insufficient, or a refrigerant contacts oil again and again, and makes it easily go together by disorder of the channel and flow, and it has not prevented and run out that oil mixes in the refrigerant gas which carries out the regurgitation out of a well-closed container.

[0006]Since the thing of an indication in the above-mentioned gazette collects and deals with oil after supplying a compressor style and its bearing part, oil condenses it, and it turns to an electric motor, and is flowed down or dropped, and even when dropped, the oil drop is large, and it is hard to multiply by it the refrigerant gas breathed out from a compressor style at the electric motor side, and it is hard to be accompanied to it. However, since it is transmitted to the dropped oil to the coil part etc. which flowed down or trickled into the portion with the complicated crevices and structures of the stator upper part of the electric motor, such as a coil part, and had the complicated crevice and structure of the stator lower part, it falls and results in the oil sump of the electric motor lower part, Being dealt with uniquely with much trouble, the contact area with a refrigerant is long, is transmitted to the coil part of the stator upper and lower sides with a complicated crevice and structure, and it by contact with a refrigerant gas with omission. It is transmitted, and since it is distributed by the refrigerant gas and is taken advantaging and accompanied to the flow, oil is prevented from mixing in the refrigerant gas which carries out the regurgitation out of a well-closed container too,

and a part of oil which falls has not run out it.
[0007]The purpose of this invention is to restrain a refrigerant and oil mostly, to deal with them, and to provide a closed compressor which can carry out the regurgitation of the gas by which vapor liquid separation was fully carried out, and a vapor-liquid-separation discharging method for the same.
[0008]
[Means for Solving the Problem]A closed compressor and a vapor-liquid-separation discharging method for the same of this invention, An electric motor for driving a compressor style which a compressor style and this compressor style provided caudad in a well-closed container, It is a thing about a closed compressor which makes it basic constitution to have had a lubrication mechanism which supplies oil of an oil sump which provided torque of this electric motor in a crankshaft for transmitting to a compression mechanism part, and the lower part in a well-closed container to a bearing part and a compressor style sliding part of a crankshaft through a crankshaft, In order to attain the above-mentioned purpose, the 1st closed compressor, A compressor style communicating path which gas breathed out from a compressor style makes the lower part of a compressor style open for free passage from a regurgitation room in a container of the upper part of a compressor style, and this regurgitation room in a container, A communication passage which follows a rotator upper chamber from this compressor style communicating path, a rotor passage established in a rotator so that a rotator upper chamber and a rotator lower room might be made to open for free passage, After escaping through a stator passage provided between a stator or a stator, and a well-closed container to a stator upper chamber of a circumference of outside of said communication passage so that it may result under an electric motor through a rotator lower room one by one and the lower part and the upper part of a stator may be made to open for free passage further, It is characterized by providing a gas passageway in a container breathed out out of a well-closed container through an external delivery established in a portion beyond a position of a stator upper chamber of a well-closed container.
[0009]In such composition, a regurgitation room in a container of the upper part of a compressor style, this regurgitation room in a container, and a compressor style communicating path that makes the lower part of a

compressor style open for free passage are first located in an area around of a compressor style and its bearing part, It is made to breathe out with a strong turning stream which led gas by which gas breathed out from a compressor style was put in block, a communication passage of the compressor style lower part was made to breathe out, and a communication passage has been breathed out to a rotator upper chamber, and received rotation of a rotator to a rotator lower room through inside of a rotor passage of a rotator. Thus, by restraining and dealing with gas breathed out from a compressor style, Even if oil currently supplied to them is contacted and it is accompanying it while gas breathed out from a compressor style passes through a circumference of the enclosure of a compressor, or a bearing part, According to said strong turning stream, perform vapor liquid separation, drive away oil to a method of outside, make it adhere to inner circumference of a stator of an electric motor, and it dissociates from gas in a place near an oil sump, Since it is transmitted, and it falls [ there is almost no opportunity to multiply gas, and ], is dropped at an oil sump just below and made to be collected, oil currently accompanied to gas is efficiently separable.

[0010]Since oil currently accompanied to gas passing through a rotor passage is forced on lateral surface of a rotor passage with a centrifugal force by rotation of a rotator, is condensed from a mist state and grows up to be an oil drop, Since raise more gas liquid separation efficiency by said centrifugal separation, and an oil drop centrifuged is forced on inner circumference of a stator, it condenses, it grows up still more greatly and it is dropped at a downward oil sump, Very much in an electric motor lower room from a rotator lower room that oil after vapor liquid separation trickles into an oil sump Later, Are hard to take advantaging of a flow of gas which makes a U-turn upward and goes to a stator passage, and also a flow of said gas which makes a U-turn according to a centrifugal force at the time of U-turn. Since an operation which is going together, or also helps the gravity, shakes off oil which it is going to accompany towards a lower oil sump, and is flipped off again is carried out, a recovery rate of said oil which centrifuged and still remains into gas can be raised.

[0011]Gas by which oil was separated as mentioned above arrives at a stator upper chamber of a certain communication passage which is a circumference of outside further through a stator passage at a circumference of said

bearing, Since it comes to carry out the regurgitation from a delivery in a position more than a stator upper chamber of a well-closed container, where oil is fully separated, the regurgitation can be carried out out of a well-closed container, without contacting gas which is accompanying oil and oil.

[0012]Since gas breathed out from a compressor style passes along a rotor passage and a stator passage, an electric motor can be cooled efficiently.

[0013]Although an external delivery may be established in a stator upper chamber of a well-closed container, an external delivery is established in a regurgitation room for the outside of the container on a compressor style of a well-closed container, If a compressor style rise communicating path is provided between a compressor style or a compressor style, and a well-closed container so that a regurgitation room for the outside of this container and said stator upper chamber may be made to open for free passage, Since a collision between compression mechanism parts can separate further oil which has remained in addition in gas when gas goes into a compressor style rise communicating path from a stator upper chamber, the separation effect of oil improves further.

[0014]In composition with the larger cross-section area of a stator passage than a cross-section area of a rotor passage, since the rate of flow of gas pressured upwards to the upper part of a well-closed container after centrifugal separation is reduced, influence which oil is made to accompany is weakened, residual oil and new oil can be made hard to pressure upwards, and the separation effect of oil can be heightened.

[0015]In composition which a communication passage forms in a wide area rather than a formation region of a rotor passage, since it becomes easy to lead gas breathed out by the compressor style lower part to a rotor passage, probability of vapor liquid separation by the above-mentioned restraint of discharged gas becomes high, and the separation effect of oil becomes high.

[0016]In composition which established one or an outward branching hole beyond it which carries out an opening to a periphery of a rotator in a rotor passage. Through said branching hole, centrifugal discharge is carried out and separate into a stator periphery from gas promptly, and oil forced on the outside of a rotor passage with a centrifugal force by rotation of a rotator considers it as a big oil drop, and comes to adhere,

be transmitted and fall to inner circumference of a stator, It can combine with gas being breathed out and centrifuged from a rotor passage at a rotator lower room, and the separation effect of oil can be heightened.

[0017]In composition shifted mutually, an axis of a compressor style rise communicating path and a stator communicating path which make an outdoor regurgitation room and a stator upper chamber open for free passage. Since it does not escape and a collision with a compression mechanism part in case gas breathed out by stator upper chamber goes into a compressor style rising passage is made to perform strongly from a stator passage, the oil separation effect can be heightened.

[0018]Gas breathed out from a compressor style the 2nd closed compressor A regurgitation room in a container of the compressor style upper part, A compressor style communicating path which the lower part of a compressor style is made to open for free passage from this regurgitation room in a container, A communication passage enclosed with passage covering so that it might continue from this compressor style communicating path to a rotator upper chamber, A rotor passage established in a rotator so that a rotator upper chamber and a rotator lower room might be made to open for free passage, After escaping through a stator passage provided between a stator or a stator, and a well-closed container to a stator upper chamber of a circumference of outside of said communication passage so that it may result under an electric motor through a rotator lower room one by one and the lower part and the upper part of a stator may be made to open for free passage further, It is characterized by providing a gas passageway in a container breathed out out of a well-closed container through an external delivery established in a portion beyond a position of a stator upper chamber of a well-closed container.

[0019]Gas breathed out from a compressor style is put in block in such composition, and a communication passage of the compressor style lower part is made to breathe out, Since passage covering forms a communication passage in making it breathe out with a strong turning stream which led gas by which a communication passage has been breathed out to a rotator upper chamber of an electric motor, and received rotation of a rotator to a rotator lower room through inside of a rotor passage of a rotator and inside and outside are divided into it, It is easy to restrain so that it may show gas from a compressor style to rotator upper space and may go into a rotor passage

as compared with the 1st closed compressor, Can abolish a flow of gas which avoids oil separation by rotation and a turning stream of said rotator, can heighten the oil separation effect, and, The oil separation effect of gas as for which the regurgitation carries out contacting oil from a bearing part to which gas which pressures upwards to stator upper space after centrifugal separation, and is breathed out out of a well-closed container is located in gas and the communication passage inside in front of oil separation as it prevents and oil does not newly mix can be heightened.

[0020]A regurgitation room in a container in composition currently formed by a muffler provided so that an upper exhaust port of a compressor style might be covered. When combine with a silence operation using a compressor style upper chamber being obtained, make gas pressured upwards to a stator upper chamber after centrifugal separation collide with a compression mechanism part, oil is separated, it leads to a compressor style upper chamber through a compressor style rising passage and the regurgitation is carried out out of a well-closed container, Out of this after [ oil separation ] well-closed container, it can prevent contacting gas in front of oil separation by which gas which carries out the regurgitation is breathed out from a compressor style, and the oil separation effect can be heightened.

[0021]Composition to which passage covering has extended to the balance weight inside provided in a periphery of a rotator upper bed from the compressor style side, And in composition prolonged to the outside of a balance weight provided in a rotator upper bed from the compressor style side, restrictiveness which leads gas breathed out from a compressor style even to a rotor passage increases, and the part oil separation effect can be heightened.

[0022]If passage covering is an annular bearing cover provided in the surroundings outside a bearing member of a crankshaft, It can restrain so that oil supplied to a compression mechanism part and its bearing part may be collected in a communication passage which passage covering forms and said centrifugal separation may be presented with discharged gas, And it can avoid that gas which pressures upwards to a stator upper chamber after centrifugal separation, and is breathed out out of a well-closed container contacts gas before centrifugal separation which is accompanying oil and oil from a bearing part, and newly accompanies oil, and the oil separation

effect can be heightened.

[0023]In composition which forms a part of compressor style communicating path between bearing members, a bearing cover tends to form a passage in leading gas which was breathed out from a compressor style and resulted in the compressor style lower part through a compressor style communicating path to a communication passage of a well-closed container center section corresponding to rotator upper space using an outside surface of a bearing member.

[0024]In passage covering, the lower end part approaches with a stator or a rotator almost in contact with a stator, In composition which constituted a seal part which controls that gas which flows into a rotor passage flows out of a communication passage outside on the way, restrictiveness which presents centrifugal separation with gas and oil can be improved further, and the separation effect of oil can be heightened.

[0025]A balance weight can form passage covering.

[0026]Gas breathed out from a compressor style the 3rd closed compressor A regurgitation room in a container of the upper part of a compressor style, A compressor style communicating path which the lower part of a compressor style is made to open for free passage from this regurgitation room in a container, A communication passage enclosed with passage covering so that it might continue from this compressor style communicating path to a rotator upper chamber, A rotor passage established in a rotator so that a rotator upper chamber and a rotator lower room might be made to open for free passage, After escaping through a stator passage provided between a stator or a stator, and a well-closed container to a stator upper chamber of a circumference of outside of said communication passage so that it may result under an electric motor through a rotator lower room one by one and the lower part and the upper part of a stator may be made to open for free passage further, It is characterized by having provided a gas passageway in a container breathed out out of a well-closed container through an external delivery established in a portion beyond a position of a stator upper chamber of a well-closed container, and forming an oil separation board which makes discharged gas from a stator passage collide in a rotator lower room.

[0027]Gas immediately after being breathed out by rotator lower room from a rotor passage is made to collide to a division plate strongly in such

composition, By separating oil currently accompanied well, and drop-izing mist of oil, and growing up it, and presenting centrifugal separation by revolution immediately, When a division plate narrows flatly a revolution field of gas breathed out by rotator lower room, gathers a swing speed and raises a centrifugal separation operation, it can compare with the 1st and 2nd closed compressor, and the separation effect of oil can be heightened.

[0028]As [ close / by balance weight / centrifugal separation is possible and / if at least a part on the circumference of space between a division plate and a lower end of a rotator is carrying out the opening to the side / it / selectively ]

[0029]A division plate in composition which forms a passage crevice between crankshafts. Since it becomes easy to prevent accompanying to gas which promotes carrying out the regurgitation of the gas centrifuged to oil at an electric motor lower room through the centrifugal separation direction of oil, and a passage crevice in an almost right-angled center section and by which oil centrifuged carries out the regurgitation to an electric motor lower room, the separation effect of oil can be heightened.

[0030]A passage crevice prevents gas breathed out by rotator lower room from serving as a bypass which avoids a collision with a division plate from a rotor passage, and the collision separation effect by a division plate of oil can be prevented from falling in composition which has a passage crevice inside a rotor passage.

[0031]In composition in which a compressor style and oil exhaust passage from the bearing part are carrying out the opening into said communication passage. Since oil after presenting a compression mechanism part and its bearing part tends to prevent contacting gas which flows out of a communication passage and is breathed out out of a well-closed container after oil separation, the separation effect of oil can be heightened.

[0032]Oil exhaust passage with said compressor style communicating path with composition provided in the opposite side. While oil flowed down which or dropped at a communication passage disperses, prevents mist-izing and deals with it together with gas by gas which breathes out in the compressor style lower part from a compressor style communicating path, and flows into a communication passage, separation efficiency with gas is raised.

[0033]The above 1st - an operation in the 3rd closed compressor are realizable also as an invention of a vapor-liquid-separation discharging

method of the following closed compressors. A vapor-liquid-separation method of the closed compressor, By restraining mostly oil after supply to gas breathed out into a well-closed container from a compressor style, a compressor style, and its bearing part, letting it pass from a rotator upper chamber to a rotor passage, and leading to a rotator lower room, present compulsive revolution by rotation of a rotator and vapor-liquid is centrifuged, As oil which goes outside by centrifugal separation adheres, and it is transmitted to inner circumference of a stator and it falls to it, while making it dropped at an oil sump just below, Let oil and a separated refrigerant pass from an electric motor lower room to a stator passage between a stator or a stator, and a well-closed container, and it is led to a stator upper chamber outside a field of said restraint, It is made to breathe out out of a well-closed container from a portion beyond a position of a stator upper chamber of a well-closed container, and is characterized by carrying out the regurgitation of the refrigerant gas which carried out vapor liquid separation to oil.

[0034]Centrifugal discharge by a branching hole which branched towards a rotator periphery from a rotor passage can be aimed at about oil which passes along a rotor passage also in this case, a refrigerant gas breathed out by rotator lower room from a rotor passage can be made to be able to collide with a division plate, and collision separation can also be aimed at.
[0035]The purpose and the feature beyond it of this invention become clear with the following detailed explanation and drawings. each feature of this invention is boiled as much as possible, is set, and is independent [ its ], or various -- it can combine, come out, compound and use.
[0036]
[Embodiment of the Invention]It explains referring to a figure for a closed compressor concerning the embodiment in this invention, and a vapor-liquid-separation discharging method for the same hereafter, and an understanding of this invention is presented.
[0037]This embodiment is an example in the case of the closed compressor for refrigerating cycles which contained the compressor style of the scroll type with the vertical mold, and a compression object is a refrigerant gas. However, this invention is not restricted to this and compressed for the general gas which built in various kinds of compressor styles, such as a

compressor style of rotary system, in the well-closed container with the electric motor which drives it, A compressor style divides the inside of a well-closed container up and down, and if it is a closed compressor which accommodates an electric motor in the lower part, it applies to the whole, is effective, and belongs under the category of this invention.

[0038]the closed compressor of this embodiment is shown in drawing 1 - drawing 3 -- as -- the inside of the well-closed container 1 -- welding -- burning and inserting in -- etc. -- it carrying out and between the main-guide-bearing member 11 of the fixed crankshaft 4, and the fixed scroll 12 which carried out the bolt stop on this main-guide-bearing member 11, Put the turning scroll 13 which gears with the fixed scroll 12, and the compressor style 2 of a scroll type is constituted, The rotation regulatory apparatus 14 by the Oldham ring etc. which are guided so that the circular orbit movement of the rotation of the turning scroll 13 may be prevented and carried out between the turning scroll 13 and the main-guide-bearing member 11 is established, The circular orbit movement of the turning scroll 13 is carried out by carrying out the eccentric drive of the turning scroll 13 by the main shaft part 4a in the upper bed of the crankshaft 4, It uses becoming small while the compression space 15 which this forms between the fixed scroll 12 and the turning scroll 13 moves to a center section from the periphery side, It repeats the refrigerant gas which inhales and compresses the refrigerant gas and consisted of the admission port 17 of the peripheral part of the suction pipe 16 which led out of the well-closed container 1, and the fixed scroll 12 beyond predetermined pressure pushing the reed valve 19 open from the delivery 18 of the center section of the fixed scroll 12, and making it breathe it out in the well-closed container 1.

[0039]The lower end of the crankshaft 4 reaches the oil sump 20 of the lower end part of the well-closed container 1, and a bearing is carried out into the well-closed container 1 by welding and the countershaft carrier member 21 fixed by burning, inserting in and carrying out, and it can rotate stably. the electric motor 3 is located between the main-guide-bearing member 11 and the countershaft carrier member 21 -- the well-closed container 1 -- welding -- burning and inserting in -- etc. -- with the stator 3a fixed by carrying out. It comprises the rotator 3b which was combined with the surroundings by one in the outside in the middle of the crankshaft 4, The

balance weights 23 and 24 stopped by the pin 22 are formed in the peripheral part of the upper-and-lower-ends side of the rotator 3b, the rotator 3b and the crankshaft 4 are stabilized by this, and it rotates, and it can be stabilized and the circular orbit movement of the turning scroll 13 can be carried out.

[0040]The lubrication mechanism 7 supplies the oil 6 in the oil sump 20 to the bearing part 66 of each part of the compressor style 2, or each sliding part of the compressor style 2 through the oil supply hole 26 which is ****(ing) the crankshaft 4 with the pump 25 driven in the lower end of the crankshaft 4. With a supply pressure or gravity, as the oil 6 after supply asks for a refuge, it flows out and trickles it under the main-guide-bearing member 11 through the bearing part 66, and it is eventually collected by the oil sump 20.

[0041]However, are making the oil 6 which contacted within the compressor style 2 accompany to the refrigerant gas 27 shown in drawing 1 breathed out from the compressor style 2 by a dashed line arrow, as actually mentioned already, or. There is a problem by which oil will also be breathed out with the refrigerant gas which disperses the oil 6 after the supply dropped under the above-mentioned main-guide-bearing member 11, is making it go together, and cannot fully separate this conventionally, but carries out the regurgitation out of the well-closed container 1.

[0042]In order that each embodiment shown in drawing 1 - drawing 3 may solve such a problem, The refrigerant gas 27 breathed out from the compressor style 2, The communication passage 34 and the rotator upper chamber 33 following the rotator upper chamber 33, and the rotator lower room 35 from the regurgitation room 31 in a container of the upper part of the compressor style 2, this regurgitation room 31 in a container, the compressor style communicating path 32 that makes the lower part of the compressor style 2 open for free passage, and this compressor style communicating path 32. It results under the electric motor 3 through the rotor passage 36 and the rotator lower room 35 which were established in the rotator 3b so that it might be made open for free passage one by one, After escaping to the surrounding stator upper chamber 38 outside said communication passage 34 through the stator passage 37 provided between the stator 3a or the stator 3a, and the well-closed container 1 so that the lower part and the upper part of the stator 3a may be made to open for free passage furthermore,

Gas-passageway in container A breathed out out of the well-closed container 1 through the external discharge pipes 39 provided in the portion beyond the position of the stator upper chamber 38 of the well-closed container 1 is provided.

[0043]The regurgitation room 31 in a container and the compressor style communicating path 32 of such gas-passageway in container A are located in an area around of the compressor style 2 and its bearing part 66, bundle up the refrigerant gas 27 breathed out from the compressor style 2, and the communication passage 34 of the lower part of the compressor style 2 is made to breathe them out. Then, the refrigerant gas 27 with which the communication passage 34 has been breathed out. It is made to breathe out with the strong turning stream B which led to the rotator upper chamber 33, made it advance into the rotor passage 36 in the state of circling loosely under the influence by rotation of the rotator 3b and the balance weight 23, passed caudad, and received rotation of the rotator 3b to the rotator lower room 35.

[0044]Thus, by restraining and dealing with the refrigerant gas 27 breathed out from the compressor style 2, Even if the oil 6 currently supplied to them is contacted and it is accompanying it while the refrigerant gas 27 breathed out from the compressor style 2 passes through the inside of the compressor style 2, or the circumference of the bearing part 66, As said strong turning stream B performs vapor liquid separation, the oil 6 is driven away to the method of outside, it is made to adhere to the inner circumference of the stator 3a and a solid line arrow shows from the refrigerant gas 27 in the place near the oil sump 20, it dissociates effectively, The oil 6 separated after that is transmitted, and is dropped at an oil sump just below with omission, since opportunities to multiply the refrigerant gas 27 are collected almost nothing, it can dissociate efficiently and the oil 6 currently accompanied to the refrigerant gas 27 can be collected.

[0045]Since the oil 6 currently accompanied to the refrigerant gas 27 passing through the rotor passage 36 is forced on the lateral surface of the rotor passage 36 with the centrifugal force by rotation of the rotator 3b, is condensed from a mist state and grows up to be an oil drop, Since raise more the gas liquid separation efficiency by said centrifugal separation, and the oil drop centrifuged is forced on the inner

circumference of the stator 3a, it condenses, it grows up still more greatly and it is dropped at the downward oil sump 20, Very much in the electric motor lower room 41 from the rotator lower room 35 that the oil 6 after vapor liquid separation trickles into the oil sump 20 Later, Are hard to take advantaging of flow C of the refrigerant gas 27 which makes a U-turn upward and goes to the stator passage 37, and also flow C of said refrigerant gas 27 which makes a U-turn according to the centrifugal force at the time of U-turn. Since the operation which it is going together, or the gravity also helps the oil 6 which it is going to accompany, and is shaken off towards the lower oil sump 20, and is flipped off is carried out, the recovery rate of said oil 6 which centrifuged and remains in addition into the refrigerant gas 27 can be raised.

[0046]The refrigerant gas 27 with which the oil 6 was separated as mentioned above, Since the regurgitation is carried out out of the well-closed container 1 from the external discharge pipes 39 of the communication passage 34 which is in the circumference of said bearing part 66 through the stator passage 37 which arrive at the stator upper chamber 38 of the circumference of outside further, and are in the portion beyond the position of the stator upper chamber 38 of the well-closed container 1, Without contacting the refrigerant gas 27 which is accompanying the oil 6, where oil is fully separated, it can breathe out out of the well-closed container 1, and a refrigerating cycle can be supplied. Therefore, decline in the heat exchanging efficiency in heat exchangers, such as piping pressure loss in the inside of a refrigerating cycle, a condenser, an evaporator, can be prevented. And since the refrigerant gas 27 breathed out from the compressor style 2 passes along the rotor passage 36 and the stator passage 37, the electric motor 3 can be cooled efficiently.

[0047]Although the external discharge pipes 39 may be formed in the stator upper chamber 38 of the well-closed container 1, It provides in the compressor style upper chamber 42 on the compressor style 2 of the well-closed container 1 so that the external discharge pipes 39 may be illustrated, By having formed the compressor style rise communicating path 43 between the compressor style 2 or the compressor style 2, and the well-closed container 1 so that this compressor style upper chamber 42 and said stator upper chamber 38 may be made to open for free passage, Since the collision between two copies of compressor styles can separate further

the oil 6 which remains in addition into the refrigerant gas 27 when the refrigerant gas 27 goes into the compressor style rise communicating path 43 from the stator upper chamber 38, the separation effect of the oil 6 improves further.

[0048]It is made for the gross area of the stator passage 37 to become large rather than the gross area of the rotor passage 36. Since the rate of flow of the refrigerant gas 27 pressured upwards to the stator upper chamber 38 after centrifugal separation is reduced by this, the oil 6 which weakened the influence which the oil 6 is made to accompany, and remains, or newly contacts can be made hard to pressure upwards, and the separation effect of the oil 6 can be heightened.

[0049]He is trying for the axis of the compressor style rise communicating path 43 and the stator passage 37 to shift mutually. Since it does not escape and the collision with two copies of compressor styles in case the refrigerant gas 27 breathed out by the stator upper chamber 38 goes into the compressor style rise communicating path 43 is made by this to perform strongly from the stator passage 37, the oil separation effect can be heightened. For this reason, a position gap of an axis is so good that it is large, and although the graphic display has not been carried out, if a circumferencial direction is made to carry out the position gap of it, it will shift, and it can set up quantity greatly.

[0050]The regurgitation room 31 in a container is formed by the muffler 50 provided so that the upper exhaust port 18 of the compressor style 2 might be covered so that it may illustrate. It combines with the silence operation using the compressor style upper chamber 42 being obtained by this, In the above-mentioned structure which makes the refrigerant gas 27 pressured upwards to the stator upper chamber 38 after centrifugal separation collide with two copies of compressor styles, separates the oil 6 further, is led to the compressor style upper chamber 42 through the compressor style rise communicating path 43, and carries out the regurgitation out of the well-closed container 1, After this oil separation, it can prevent contacting the refrigerant gas 27 in front of the oil separation by which the refrigerant gas 27 which carries out the regurgitation out of the well-closed container 1 is breathed out from the compressor style 2 in the compressor style upper chamber 42, and the oil separation effect can be heightened.

[0051]As long as said communication passage 34 can determine the channel of the refrigerant gas 27, an open sand mold may be sufficient as it, but by this embodiment, as shown in a figure, with the passage covering 51, it encloses and it is formed. Since the communication passage 34 restrains certainly by this the refrigerant gas 27 breathed out by the lower part of the compressor style 2 and it becomes easy to lead to the rotor passage 36, the probability of the vapor liquid separation by the above-mentioned restraint of the discharge refrigerant gas 27 becomes high, and the separation effect of oil becomes high. Since it prevents that the refrigerant gas 27 which the inside and outside of the communication passage 34 are divided, and oil is separated, and is breathed out by the stator upper chamber 38 contacts the refrigerant gas 27 in front of oil separation, or the passage covering 51 contacts the oil 6 which flows down from the bearing part 66, What will make the oil 6 newly go together by the time it is breathed out out of the well-closed container 1 can be abolished, and the oil separation effect can be heightened. It is preferred for the restraint by the communication passage 34 of the refrigerant gas 27 to make it the communication passage 34 follow the rotor passage 36 from the compressor style communicating path 32.

[0052]In this meaning, that lower end part approaches with the stator 3a or the rotator 3b almost in contact with the stator 3a like [ in case the passage covering 51 shows drawing 1 ], By constituting the seal part which controls that the refrigerant gas 27 which flows into the rotor passage 36 flows out of the communication passage 34 outside on the way, the restrictiveness which presents centrifugal separation with the refrigerant gas 27 and the oil 6 can be improved further, and the separation effect of the oil 6 can be heightened.

[0053]The composition to which the passage covering 51 has extended to the inside of the balance weight 23 provided in the periphery of the upper bed of the rotator 3b from the compressor style 2 side as shown in drawing 2, And as shown in drawing 3, the restrictiveness which leads the refrigerant gas breathed out from the compressor style 2 also by having extended from the compressor style 2 side to the outside of the balance weight 23 even to the rotor passage 36 increases, and the part oil separation effect can be heightened.

[0054]Especially passage covering 51 is used as the annular bearing cover

provided in the surroundings outside the main-guide-bearing member 11, It can restrain so that the oil 6 supplied to two copies of compressor style and its bearing part 66 may be collected in the communication passage 34 which the passage covering 51 forms and said centrifugal separation may be presented with the refrigerant gas 27, And it can avoid that the refrigerant gas 27 which pressures upwards to the stator upper chamber 38 after centrifugal separation, and is breathed out out of the well-closed container 1 contacts the refrigerant gas 27 before the centrifugal separation which is accompanying the oil 6, and newly accompanies the oil 6, and the oil separation effect can be heightened.

[0055]The passage covering 51 consists of the pipe coverings 51b which consist of an insulating material added to the downward cylinder part 51a2 currently formed in the inner circumference of the bearing cover 51a of the metal which carried out the bolt stop of the flange 51a1 to the main-guide-bearing member 11, and this bearing cover 51a. The metal bearing covers 51a are suitable in endurance for the passage covering 51 to form a part of compressor style communicating path 32 of the compressor style 2 between the main-guide-bearing members 11 as especially shown in drawing 1 - drawing 3, In such passage composition, it is easy to form a passage in leading the refrigerant gas 27 which was breathed out from the compressor style 2 and resulted in the lower part of the compressor style 2 through the compressor style communicating path 32 to the communication passage 34 of the center section of the well-closed container 1 corresponding to the rotator upper chamber 33 using the outside surface of the main-guide-bearing member 11. Since mutual electric influence is lost when the portion is the insulating pipe covering 51b when it contacts and approaches the coil part 3c of the stator 3a, as the passage covering 51 shows drawing 1 and drawing 3, it is suitable. As a material of the pipe covering 51b, there are PET, a sheet made from Teflon (registered trademark), etc., and there is an advantage which does not damage it even if these are not bulky and contact the coil part 3c.

[0056]However, although the passage covering 51 is not illustrated, it can also be formed by the balance weight 23, and according to this, it becomes unnecessary [ a member special to forming the passage covering 51, and attachment structure ].

[0057]As shown in drawing 1 - drawing 3, the division plate 61 which makes

the refrigerant gas 27 breathed out by the rotator lower room 35 from the rotor passage 36 collide, and separates the oil 6 is provided. The division plate 61 is circular and is attached to the rotator 3b by using the balance weight 24 as a spacer with the balance weight 24. The refrigerant gas 27 immediately after being breathed out by the rotator lower room 35 from the rotor passage 36 collides to the division plate 61 strongly by this, By separating the oil 6 currently accompanied well, and drop-izing mist of the oil 6, and growing up it, and presenting centrifugal separation by revolution immediately, When the division plate 61 narrows flatly the revolution field of the refrigerant gas 27 breathed out by the rotator lower room 35, gathers a swing speed and raises a centrifugal separation operation, the separation effect of the oil 6 can be heightened.

[0058]As [ close / by the balance weight 24 / centrifugal separation is possible and / if at least the part on the circumference of the space between the division plate 61 and the lower end of the rotator 3b is carrying out the opening to the side / it / selectively ]

[0059]Since the division plate 61 forms the passage crevice 62 between gas between the crankshafts 4 again, It promotes carrying out the regurgitation of the refrigerant gas 27 centrifuged to the oil 6 at the electric motor lower room 41 through the centrifugal separation direction of the oil 6, and the passage crevice 62 in an almost right-angled center section, Since the oil 6 centrifuged becomes easy to prevent accompanying to the refrigerant gas 27 which carries out the regurgitation to the electric motor lower room 41, the separation effect of oil can be heightened. A passage crevice is established also between the division plate 61 and the inner circumference of the stator 3a, and the centrifuged oil 6 is transmitted to the inner surface of the stator 3a, and it can be made to fall naturally.

[0060]Since it is inside the rotor passage 36 as said passage crevice 62 shows drawing 1 - drawing 3, The passage crevice 62 prevents the refrigerant gas 27 breathed out by the rotator lower room 35 from serving as a bypass which avoids the collision with the division plate 61 from the rotor passage 36, and the collision separation effect by the division plate 61 of the oil 6 can be prevented from falling.

[0061]The oil exhaust passage 63 from the bearing part 66 is carrying out the opening of what is shown in drawing 1 into the communication passage 34. Since the oil 6 after presenting two copies of compressor style and

its bearing part 66 tends to prevent by this contacting the refrigerant gas 27 which flows out of a communication passage and is breathed out after oil separation at the outside of the well-closed container 1, the separation effect of the oil 6 can be heightened.

[0062]And since this oil exhaust passage 63 is established in the opposite side in the compressor style communicating path 32, While the oil 6 flowed down which or dropped at the communication passage 34 disperses, prevents mist-izing and deals with it together with the refrigerant gas 27 with the refrigerant gas 27 which breathes out in the lower part of the compressor style 2 from the compressor style communicating path 32, and flows into the communication passage 34, separation efficiency with the refrigerant gas 27 is raised.

[0063]If one or the outward branching hole 64 beyond it which carries out an opening to the periphery of the rotator 3b is established in the rotor passage 36 as an imaginary line shows to drawing 1, Centrifugal discharge is carried out from the periphery of the rotator 3b through said branching hole 64, and dissociate from the refrigerant gas 27 promptly, and the oil 6 forced on the outside of the rotor passage 36 with the centrifugal force by rotation of the rotator 3b makes a big oil drop to the inner circumference of the stator 3a, adheres and is transmitted to it, and comes to fall to it, It can combine with the refrigerant gas 27 being breathed out and centrifuged from the rotor passage 36 at the rotator lower room 35, and the separation effect of the oil 6 can be heightened.

[0064]

[Effect of the Invention]According to this invention, by the above-mentioned explanation, restrain mostly oil after supplying the compressor style currently multiplied by which and accompanied to the discharged gas from a compressor style, and it, and its bearing part so that clearly, and it is dealt with, Presenting the strong centrifugal separation by rotation of a rotator, performing efficient centrifugal separation, and making a stator upper chamber the back reach from a stator passage with U-turn of the gas in an electric motor lower room, and centrifugal separation of the oil by it by letting a rotor passage pass. It becomes the main factor to prevent contact with the gas in front of the oil separation which goes into a rotor passage from a compressor style, and to carry out the regurgitation out of a well-closed container, and the

gas which fully separated oil can be breathed out and supplied out of a well-closed container, the regurgitation turning SU to an electric motor part, and aiming at cooling.

[Brief Description of the Drawings]

[Drawing 1]It is a sectional view showing one closed compressor concerning an embodiment of the invention.

[Drawing 2]It is a sectional view showing one closed compressor now concerning an embodiment of the invention.

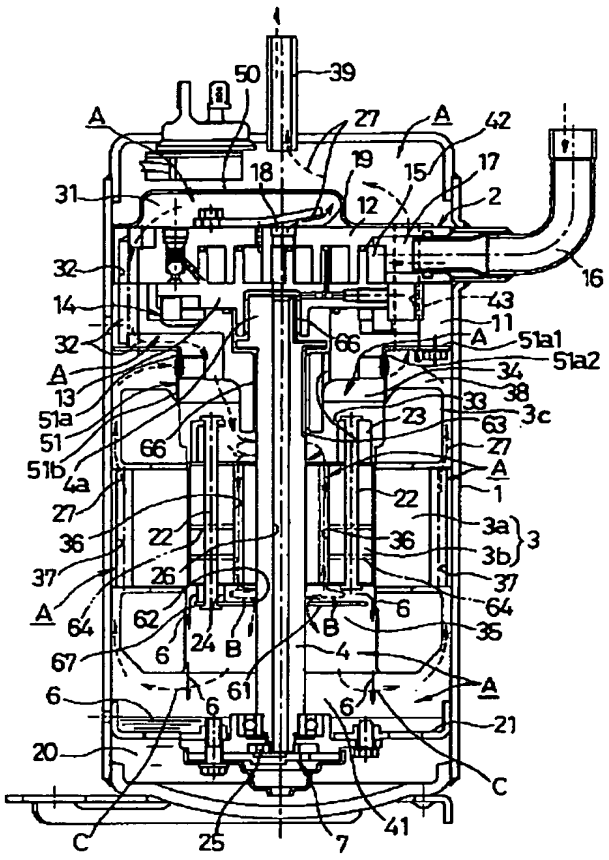
[Drawing 3]It is a sectional view showing another closed compressor concerning an embodiment of the invention.

[Description of Notations]

1 Well-closed container
2 Compressor style
3 Electric motor
3a Stator
3b Rotator
4 Crankshaft
6 Oil
7 Lubrication mechanism
17 Admission port
18 Delivery
20 Oil sump
23 and 24 Balance weight
27 Refrigerant gas
31 The regurgitation room in a container
32 Compressor style communicating path
33 Rotator upper chamber
34 Communication passage
35 Rotator lower room
36 Rotor passage
37 Stator passage
38 Stator upper chamber
39 External discharge pipes
41 Electric motor lower room
42 Compressor style upper chamber
43 Compressor style rise communicating path

40 Oil recovering passage
50 Muffler
51 Passage covering (bearing cover)
61 Division plate
62 Passage crevice
63 Oil exhaust passage
64 Branching hole
66 Bearing part

[Drawing 1]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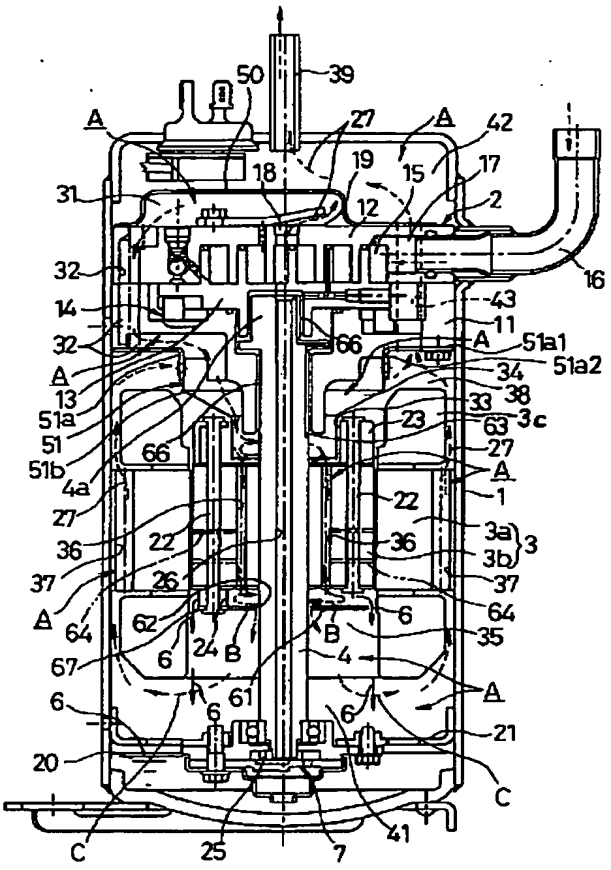
[Drawing 2]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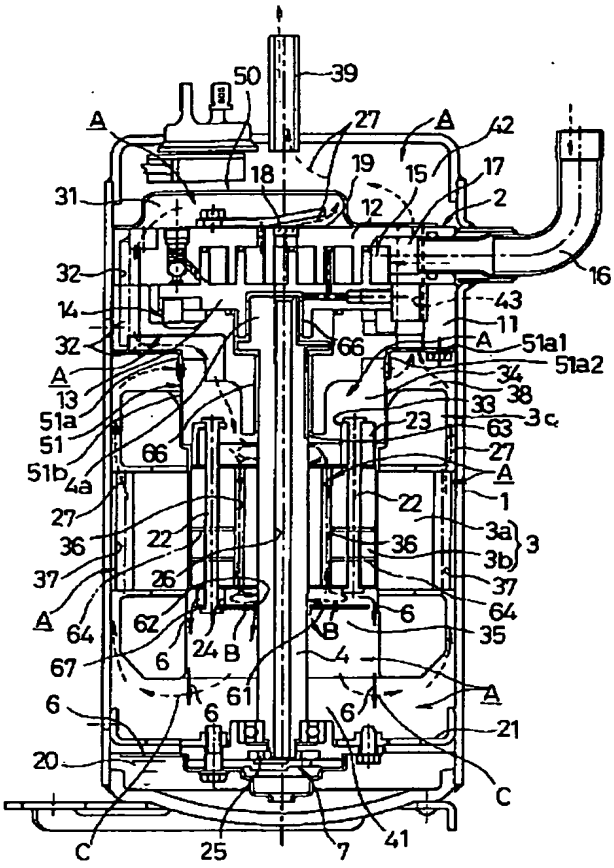
[Drawing 3]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